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# Patterns and representation in play-based learning: a systematic meta-synthesis of empirical studies in K-13+ settings

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This systematic review provides a comprehensive meta-synthesis that examines empirical research on the implementation of play-based learning in formal educational settings. The review aims to identify patterns in the enactment of play-based learning, including its representation across academic disciplines, methodologies, grade levels, geographic contexts, and key indicators of play—choice, wonder, and delight. A comprehensive search across nine databases yielded 1,475 studies, of which 87 met stringent inclusion criteria: empirical, K-13+ formal settings, and an intentional learning objective tied to play. We extracted data from each study and used thematic synthesis to analyze patterns across multiple dimensions. Findings indicate that play-based learning is predominantly explored in early childhood and elementary education, with limited research on its implementation in secondary and post-secondary contexts. Studies were concentrated in North America and Europe, highlighting a need for greater geographic diversity. Findings also reveal significant gaps in nature-based play and its role in formal learning environments. Limitations include potential selection bias due to English-language restrictions and the exclusion of studies without a curricular focus. This review underscores the need for broader research on play-based learning, particularly in underrepresented populations and adolescent education. By providing a systematic overview of current research trends and limitations, this meta-synthesis contributes to the growing body of knowledge on play-based learning and informs future research directions.

## KEYWORDS

play-based learning, playful learning, playful pedagogy, meta-synthesis, systematic review, holistic learning

## Introduction

Play is a basic human right and an important part of human development (Parker et al., 2022; United States Play Coalition, 2023). Recent societal changes, however, have resulted in a significant decline in the opportunities for children and youth to regularly play (Yogman et al., 2018). Although historically play was considered a key ingredient for well-developed and joyous childhood experiences (Frost, 2009), the onslaught of modern technology coupled with overscheduled agendas threatens the time available for children and youth to engage in play (Mainella et al., 2011).

Even in schools, curricular pressures have often resulted in less recess time due to the over-emphasis on academic achievement at the expense of students' holistic well-being (Parker and Thomsen, 2019; Stegeline et al., 2015). We know that humans learn best when they are actively involved in the learning process through meaningful, social, and joyful experiences (Zosh et al., 2017). Nonetheless, many education systems have cut opportunities for these experiences by

crowding the curriculum and over-focusing on didactic approaches (Bubikova-Moan et al., 2019; Parker and Thomsen, 2019), leaving educators seemingly confined within teacher-directed pedagogies. Recent education reforms within the United States (U.S.) have resulted in concerning impacts on classroom environments such as declining student academic success as well as a decrease in social-emotional well-being (Hirsh-Pasek et al., 2020; Nesbitt et al., 2023). This concern is not unique to the U.S., however: “schools, around the world, are more focused than ever on results” and fixating on quantifiable academic achievement to the detriment of social, joyful experiences (Parker and Thomsen, 2019, p. 16). This ever-increasing focus on direct instruction in schools is not developmentally appropriate for children or youth who are more than just recipients of knowledge but require a well-rounded and emotionally appropriate school experience (Pyle and Danniels, 2017). Children and youth need to play, and the act of playing while learning is not a frivolous endeavor, but rather an essential activity to which all humans are entitled (Isenberg and Quisenberry, 2002; United Nations [UN], 1989).

Despite the evidence pointing towards the essential nature of play within childhood, some teachers remain uncertain how to effectively infuse play into learning objectives, often perceiving a false dichotomy between acts of play and learning (Pyle and Danniels, 2017). The disruptions caused by COVID-19 have exacerbated the pressures of an already-crowded curriculum, contributing to the barriers teachers and students face to engage in various types of play and learning (see Miller et al., 2022). Yet the global pandemic also has provided an opportunity for educators to rethink and reimagine what effective and inclusive classroom learning looks like by prioritizing holistic, student-centered classroom environments (Darling-Hammond et al., 2020). The decline in play both at home and at school points towards the importance of teachers advocating for and implementing play-based learning within educational settings, combining playful pedagogies with curricular expectations.

Play-based learning – sometimes referred to as ‘playful learning’ (Hirsh-Pasek et al., 2020) – is a promising approach that has been formally examined from both a practitioner and research perspective. Various empirical work has analyzed conceptualizations of play, implementation of play-based learning, and the effects of play-infused pedagogies. Given the diverse nature of the existing research, a systematic meta-synthesis (see Leary and Walker, 2018) of play-based learning literature is called for, offering a broad perspective and advancing the field’s current knowledge. Thus, the purpose of this meta-synthesis is to examine the current state of the literature on play-based learning, developing a comprehensive understanding that generates new insights and interpretations in the field. Additionally, we aim to identify gaps or overlooked areas within play-based learning, pointing to opportunities for future research and practical application. Our analysis specifically focuses on the integration of play within formal educational settings across grade levels and disciplines. Ultimately, our goal is to deepen the understanding of play’s role in K-13+ learning environments and support teachers in implementing playful pedagogies.

Given the recent studies examining play-based learning there is a growing global interest that indicates a timeliness for this meta-synthesis of play-based learning. Our study takes a broader comprehensive perspective on *who* is engaging in play-based research and in *which fields* these studies are occurring. We systematically identify, examine, and summarize play-based

learning literature across age groups, fulfilling scholars’ suggestions that future research investigate play in adolescents and adults, rather than just younger students (Lee et al., 2022; Parker and Thomsen, 2019). Further, this review explores play-based learning in K-13+ formal school settings without limiting the inquiry to a particular subject or physical location (such as the outdoors). At the same time, we also bound our work by including only studies that have some aspect of a curricular or learning objective connected to the play, whereas other reviews have looked more generally at free play. It is our goal to shed light on this growing field, highlight patterns within the preexisting work, and underscore areas for expansion in the future as a contribution to the ever-growing landscape of play-based research. By doing so, our intentions are twofold: (1) to arm educators and educational stakeholders with a better understanding of how play-based learning may be implemented in the classroom, and (2) to offer a summary of the field and to further identify junctures and gaps within the literature. The overall research question that guided this inquiry is: *What are the patterns within empirical studies on play-based learning?* Secondary research questions pertaining to particular patterns were:

- *What is the representation of academic journals publishing empirical studies about play-based learning?*
- *What is the chronological representation of studies published on play-based learning?*
- *Which grade/age-levels are represented within empirical studies on play-based learning?*
- *What academic content areas are represented within empirical studies on play-based learning?*
- *What methodologies are prevalent within empirical studies on play-based learning?*
- *In what ways are indicators of choice, wonder, and/or delight described (or not) within empirical studies on play-based learning?*
- *Which geographic locations are represented in empirical studies about play-based learning?*
- *What are the modalities of play-based learning described in these empirical studies?*

## Conceptual framework

Our conceptual framework situates this inquiry within the existing research by considering the definition of play, the conceptualization of play-based learning, and the current understanding of play’s benefits. We review the literature to position our work within the broader field of play-based learning, including previous reviews or meta-analyses related to our study. In addition, it is important to locate *ourselves* within the inquiry, including the system of beliefs and theories that has informed the work (see Maxwell, 2013). Our conceptual framework is grounded in a pragmatist paradigm, meaning we perceive ontology and epistemology as inseparable as well as acknowledge the overlap between knowing and doing (see Butler-Kisber, 2010). In the methods section, we further describe the ways in which our pragmatic approach guided and supported the inquiry as a key contributor to our conceptual framework.

## What is play?

Scholars and practitioners have long disagreed on the definition of play (Barnett and Owens, 2015; Fleer, 2011; Pyle and Danniels, 2017). Some have even considered play's definition *elusive* (Yogman et al., 2018) since the field lacks a consensus regarding specific terms related to play and play-based learning (Pramling Samuelsson and Björklund, 2023). Indeed, there are a wide variety of definitions found within the literature (Fleer, 2011) with some of these differences perhaps correlated to cultural variances in the way in which play is conceptualized and enacted (Roopnarine, 2015).

Recent efforts have sought to develop conceptual frameworks and common language related to play, as evidenced by collaborative projects that have synthesized the nuanced terminology from the field in order to present a cohesive taxonomy (see Lee et al., 2022). In 2016, The Pedagogy of Play Research Team developed indicators of playful learning based on prior research and field-based activities. They clearly conceptualized play within three overlapping categories: choice, wonder, and delight (Mardell et al., 2016). The National Association for the Education of Young Children (NAEYC, 2020) adopted these defining categories into their 2020 position statement on developmentally appropriate practices. And despite the association here with early childhood education, we are choosing to use this definition of play as part of our conceptual framework due to its broad representation within the field and its strong synthesis of ideas presented into a unified meaning that may be applied to a variety of ages. Consequently, for the purposes of this study, we define play as an activity in which one experiences choice, wonder, and delight. We briefly describe each of these characteristics below.

### Choice

Student agency is central to play-based learning (Parker et al., 2022) and is even regarded as a beneficial outcome of play (see Yogman et al., 2018). Other sources posit that play typically, but not necessarily, has some sense of agency or voluntary engagement (see Lee et al., 2022). Most scholars agree that a student's voice and choice is a hallmark of true play (Fleer, 2011), and that external support from a teacher in response to a student's initiation adds a goal-orientation to the activity (Pramling Samuelsson and Björklund, 2023).

### Wonder

In addition to having an agency aspect, play is also defined by wonder. This component of play is not as widely evident in the literature as its predecessor, but there is evidence of wonder-adjacent

words—curiosity, surprise, fascinate, etc.—that indicate how play is fundamentally considered to be a wonder-full experience. For example, Gray (2015) stated that imagination and creativity are key elements within play's "constellation of characteristics" (p. 124). Fleer (2011) argued that merging imagination and cognition becomes a key access point for linking play and learning within a school environment, emphasizing the role of wonder within play.

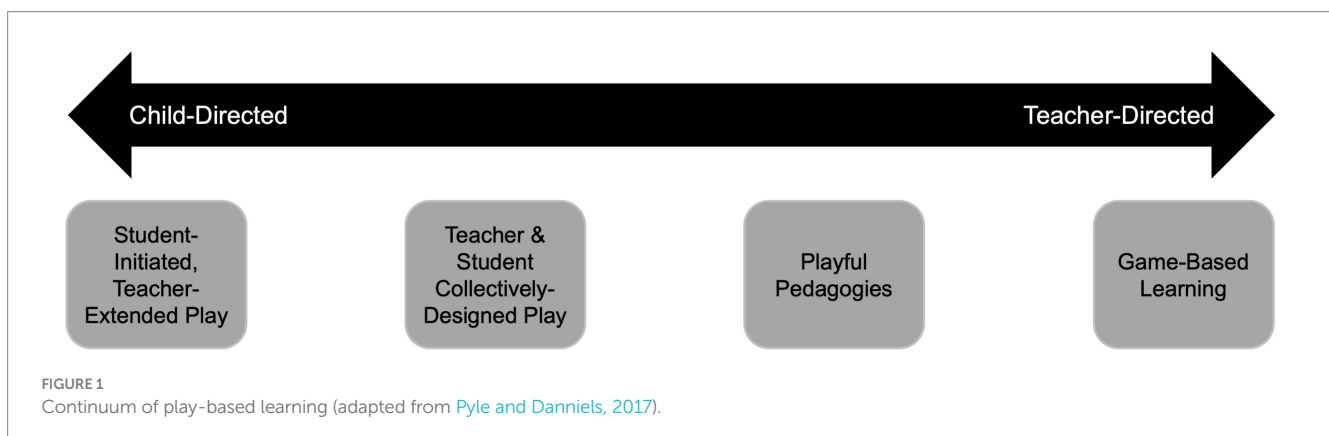
### Delight

Scholars seem to agree that the delight—joy, excitement, and other positive emotions—is an intrinsic component of play (see Hirsh-Pasek et al., 2020; Isenberg and Quisenberry, 2002; Nesbitt et al., 2023). Play must include some type of pleasurable emotion since "play would not be playful if it were not fun" (Eberle, 2014, p. 224). Given this notion that play is composed of choice, wonder, and delight, we turn now to conceptualizations of play when it is intermixed with learning.

## How is play integrated into learning?

The relationship between play and learning is complex and one that is often shaped by education policy at the regional or national level (Pramling Samuelsson and Björklund, 2023). For many years, there has been a "false dichotomy" between play and learning (Yogman et al., 2018, p. 7) that scholars have recently begun to address in hopes of reconciling the two concepts. For instance, Pyle and Danniels (2017) asserted that play and learning are not dichotomous but exist on a continuum from free-play (completely student-directed) to game-based learning (teacher directed). Given our focus on play as it is combined with a learning objective, free-play is not included in our meta-synthesis. Figure 1 displays an adaptation of Pyle and Danniels' (2017) continuum; play-based learning will be conceptualized in our review as play and learning combined in any of these configurations.

Towards the left of the continuum, this type of play is student-initiated, but teacher-extended through the incorporation of academic content or skills (Pyle and Danniels, 2017). On the right end, learning through games is a teacher-directed activity wherein students are expected to achieve a learning objective through a fun, engaging game (Pyle and Danniels, 2017). This continuum represents varying gradations of student autonomy and teacher scaffolding and appropriately accommodates for the significant differences within conceptualizations of play-based learning (see Skene et al., 2022).



The importance of recognizing play-based learning on a continuum is that it acknowledges play as an active part of learning rather than negating its educational value (see [Parker et al., 2022](#)) or setting up an unnecessary dichotomy between play and learning. Harkening back to our conceptualization of play defined by choice, wonder, and delight, it is important to note that teacher involvement does not usurp all student agency; rather it becomes a shifting in roles as both student and teacher have a sense of autonomy. Play-based learning is located within the in-between spaces of free play and direct instruction by including components of student-led learning and adult-led learning objectives ([Weisberg et al., 2013](#)). Although other scholars have put forth similar conceptualizations of play and learning on a continuum relating to student and teacher roles (see [Hirsh-Pasek et al., 2020](#); [Pramling Samuelsson and Björklund, 2023](#)), we chose to use a continuum of play based on [Pyle and Danniels' \(2017\)](#) work due to its basis in empirical research as well as its prevalence in the field of play-based learning. Within this meta-synthesis, our adapted version of [Pyle and Danniels' \(2017\)](#) continuum of play represents play-based learning as having a teacher-selected learning objective coupled with a sense of flexibility and imagination or creativity on behalf of the educator ([Skene et al., 2022](#); [Weisberg and Zosh, 2018](#)).

## Why is play-based learning important?

There are many benefits of play-based learning that have been well-researched and documented. As early as [Vygotsky \(1978\)](#), a stream of research investigated the positive outcomes of merging student agency with adult scaffolding. There is a consensus that, based on the science of how people learn, play becomes an avenue through which students can engage in meaningful, active, and social experiences (see [Nesbitt et al., 2023](#)). Since play and learning are intertwined, teachers can support knowledge and skill acquisition by creating space for students to play while learning ([Yunianti, 2020](#)).

Play can also support the development of specific academic skills, such as literacy ([Rand and Morrow, 2021](#); [Snow et al., 2016](#)), numeracy ([Scalise et al., 2019](#)), and spatiality ([Levine et al., 2012](#)). Academic performance and learning gains are impacted by a positive classroom climate since “learning is more likely to stick when it is joyful” ([Nesbitt et al., 2023](#), p. 144, emphasis original). Play-based learning is one avenue through which to incite joy and passion in students, which leads to reduced stress and stronger executive functioning skills ([Diamond and Lee, 2011](#)).

In today's classrooms, integrating thinking skills into the curriculum has become quite common as educators work to support student capabilities in critical thinking, creativity, collaboration, etc. Research points towards the effectiveness of play in developing a variety of these skills, including problem solving, self-regulation, and recall ([Bergen, 2002](#)). Play contributes to both convergent and divergent thinking in students due to its flexible and experimental characteristics ([Barnett, 1990](#)). Students who have opportunities to implement play as a strategy for learning experience gains in academic and thinking capacities, leading towards their success in acquiring 21st century skills ([Yunianti, 2020](#)).

In sum, there is a significant amount of evidence that suggests play-based learning combines the benefits of both direct instruction as well as free play, leading towards positive gains in student academic achievement alongside overall health and well-being ([Pyle and](#)

[Danniels, 2017](#); [Yogman et al., 2018](#)). There is a growing movement towards conceptualizing play-based learning as a valid instructional approach that offers the combined benefits of cognitive and social-emotional development ([Fisher et al., 2011](#)). As scholars and educators, this resonates with our holistic view of learning in that it comprises more than just the cognitive realm, but the social, emotional, creative, and physical components of a child or youth's development as well (see [Parker and Thomsen, 2019](#)).

## Methods

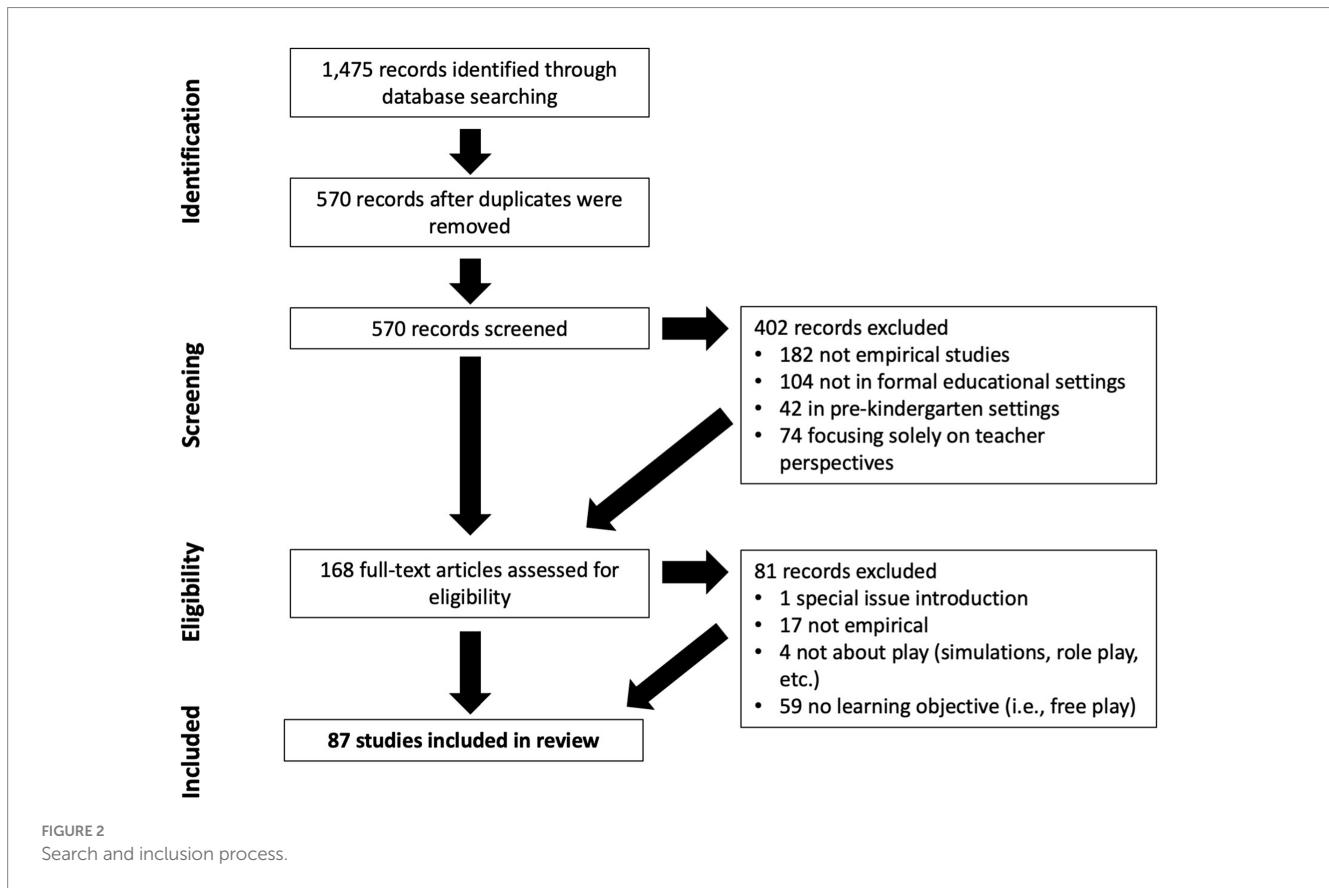
In general, the purpose of a meta-synthesis [sometimes called a systematic review ([Leary and Walker, 2018](#))] is to locate and summarize related studies within a specific field with the goal of evaluating current knowledge as well as what is not yet known ([Owens, 2021](#)). While there have been other systematic reviews related to play-based learning, many of these had highly-specific goals that did not allow for a broad analysis of the field. For instance, [Skene et al. \(2022\)](#) completed a meta-analysis to understand the ways in which different empirical studies have incorporated guided play interventions into early childhood classrooms and the effectiveness of these interventions. [Lee et al.'s \(2022\)](#) systematic synthesis sought to develop collective terminology, taxonomy, and ontology surrounding outdoor play (as well as outdoor learning). [Parker and Thomsen's \(2019\)](#) scoping study “maps the territory” within play-based pedagogies, offering descriptions and evidence that support the holistic impact of learning through play, but was not a systematic review. Given these highly-focused studies, [Skene et al. \(2022\)](#) suggested that future researchers broaden the focus on play-based learning—a call we are responding to with this meta-synthesis. To be clear, we are not discounting this previous work. On the contrary, these recent reviews examining play-based learning highlight a wide-reaching interest that underscores the timeliness of this meta-synthesis.

As previously mentioned, our pragmatic paradigm is reflected in the way in which we approached the research, including our choice to conduct a meta-synthesis to understand the current state of play-based learning within the field of education. Pragmatists are typically interested in the cumulative, social knowledge of society and choose research methods that best attend to the research questions (see [Butler-Kisber, 2010](#)). To ensure the practicality and quality of this review, we followed the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines ([Moher et al., 2010](#)) for conducting and reporting systematic reviews. [Figure 2](#) provides a visual representation of our methods.

## Search parameters

Within EBSCOhost, we began by searching the following databases to capture a wide range of studies:

- APA PsycInfo
- APA PsycArticles
- Econlit
- Education research complete
- Education full text
- ERIC



- Professional development collection
- Social Sciences full text
- SocIndex with full text

In particular, we selected education-related databases due to our focus on play-based learning in formal K-13+ settings, psychology and social science databases to capture studies that may consider why and how play-based learning occurs, and an economics database to discover any additional outcome-based studies. The inclusion of databases beyond an education focus allowed us to cast a broader net when investigating studies on play-based learning.

Once databases were selected, we entered the search terms “play based learning OR play-based learning OR learning through play OR playful learning.” Note that “play” and “learning” were combined in each search term because we sought to investigate this specific pedagogical approach. There are several ways in which play can manifest within education, but we were interested in how play is *intentionally* intertwined with learning in the literature. After entering the search terms, we further filtered results by checking “peer reviewed,” “academic journals,” and “English language,” and searched beginning in the year 2000. This yielded 1,475 records. After removing duplicates, this resulted in 570 records as of September 1, 2023.

## Screening and eligibility

To begin screening the 570 records, each author reviewed 10 abstracts independently to reduce bias using the following procedure.

First, we entered the article title, authors, publication date, journal, and DOI (if available) into a spreadsheet. Then we classified studies in the spreadsheet using the following categories:

- Empirical study—yes/no/unknown (Note: systematic reviews of the literature and meta-analyses were categorized as empirical studies;<sup>1</sup> articles were required to have clear, detailed methodology to be considered empirical)
- K-13+ setting (i.e., a formal school setting)—yes/no/unknown (Note: online formal schooling within school hours were categorized as a K-13+ setting; *ad hoc* online courses did not meet this criterion)
- Type of setting—Elementary (K-5)/Middle (6–8)/Secondary (9–12)/Postsecondary (13+)/Teacher-Focused (the grade-level setting was somewhat irrelevant due to the main focus being on teachers)/unknown
- Notes—questions we had, items to consider, etc.

Once each author reviewed 10 abstracts independently, we met to discuss questions we had about the classification within categories and

<sup>1</sup> We understand that the inclusion of literature reviews and meta-syntheses in literature reviews is a debatable practice. However, we chose to include these articles because our focus was on exploring what exists and what patterns have been observed. Further, the authors’ analyses were based on empirical research they conducted.

how to further define classifications. Once agreement was reached, we shared responsibilities for reviewing the remaining 550 abstracts.

After our initial review of abstracts, we determined that 388 studies appeared to be empirical and excluded 182 articles that did not describe empirical studies. We then turned our attention to the setting of the research. Given our focus on play-based *learning*, we made the decision to only include kindergarten (students aged 5–6) through formal post-secondary education settings (schools and universities as opposed to museums, nature centers, etc.), as instructors at these levels are more likely to have consistent academic learning standards with which they are to evaluate students. We acknowledge that many pre-kindergarten educational settings do have standards to which they adhere (e.g., NAEYC has standards for settings that wish to be NAEYC-accredited). However, standards such as these often describe what the settings or instructors should provide rather than discrete knowledge or skills students should master. Consequently, we sought to include K-13+ formal educational settings because they would be much more likely to require students to learn particular content or skills through play.

For a similar reason, we also made the decision to exclude studies that focused on teachers' impressions, opinions, or beliefs of play-based learning. While these studies reveal important information about teachers' philosophies of play-based learning, we sought to investigate actual enactments of play-based learning in our review. However, we *did* include studies that investigated students' perceptions of their play-based learning experiences because it reflected their actions. Given these considerations, we further excluded 104 articles that did not take place in formal education settings, 42 articles that took place in pre-kindergarten settings, and 74 articles that were focused on teachers' perspectives, resulting in a grand total of 168 articles that were then fully and closely read to ensure they met our inclusion criteria for the review.

Upon a close reading of these 168 articles by both authors, 81 further articles were excluded from review for a number of reasons, including being a special issue introduction (Mardell et al., 2023), not actually being about play (e.g., role play for medical students; King et al., 2015), presenting a case study of a play-based activity with little description of research methodology (e.g., Cuiñas et al., 2011), or not having a concrete learning objective and thus falling into the category of “free play” rather than “play-based learning” (e.g., Coates and Pimlott, 2019). Therefore, the remainder of this review will be based on 87 articles<sup>2</sup> that met all of our inclusion criteria and had a focus on the enactment of play-based learning. Figure 2 is a visual representation of our search and inclusion process.

After we established the final set of 87 articles, we extracted data from these articles using Google Sheets with each research question serving as a column header. This enabled both members of the research team to individually track patterns related to: academic journals, settings, methodologies, geographic locations, and modalities of play-based learning. We also looked for indicators of choice, wonder, and delight represented within the articles by searching each manuscript for synonyms of the three indicators using The Pedagogy of Play Research Team's graphic (Mardell et al., 2016, p. 7) which illustrates the overlap between the three indicators along with equivalents for each word. We tracked this extracted data within the

Google Sheets document using *choice*, *wonder*, and *delight* as respective column headers. Both members of the research team discussed the extracted data, going through each column of the Google Sheets document. There were no discrepancies during this process.

## Findings

This review sought to answer the overarching question: *What are the patterns within empirical studies on play-based learning?* To begin, we will provide descriptive characteristics of the 87 studies related to our secondary research questions. We will then delve into trends and themes seen within the studies.

### Academic journal representation

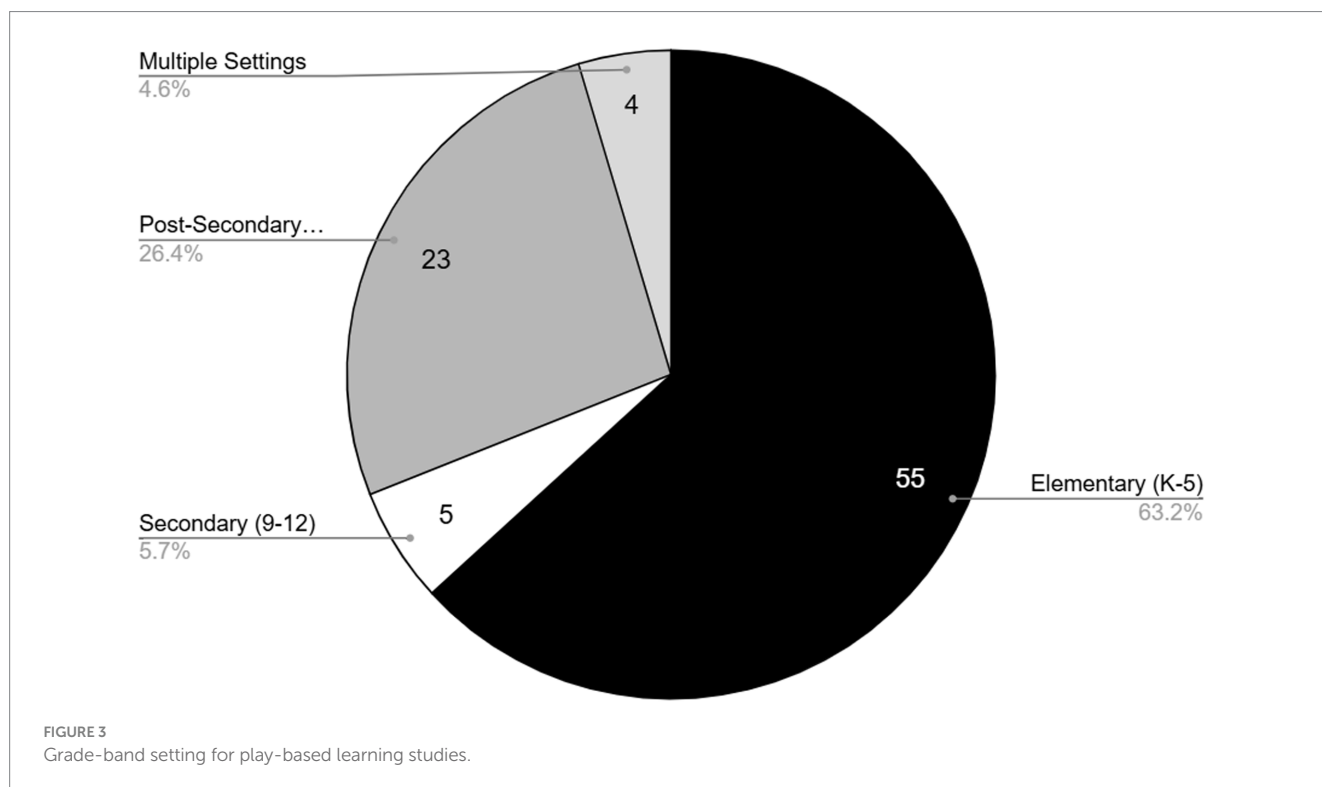
The articles in this review came from 64 different academic journals. This demonstrates that there is no single journal in which play-based learning is a major topic. To be clear, there is an *International Journal of Play*, but this journal encompasses “all facets of play” (as advertised on their website)—not just play-based learning. Additionally, it should be noted that many of the articles that initially appeared in the search from this journal were eliminated because they were not empirical studies; the journal encourages theory papers, policy critiques, position papers, and essays in addition to empirical studies. After screening articles for inclusion in the review, two articles came from the *International Journal of Play*.

The journal with the most publications was *Early Childhood Education Journal*, with five articles. *Thinking Skills & Creativity* had four articles, while the *Journal of Early Childhood Teacher Education*, *Teaching and Teacher Education*, and *Technology, Pedagogy and Education* had three articles each. There were 10 journals that contained two play-based learning articles each, while 49 journals published only one article each on play-based learning. The impact factors of these journals varied greatly, from 17 journals without impact factors to *Computers & Education* with a 2022 Journal Citations Report (JCR) Impact Factor of 12.0. The mean 2022 JCR Impact Factor of the 47 journals that did have impact factors was 2.86, with a median of 2.20. In terms of when these articles were published, Figure 3 demonstrates a general increase in attention to play-based learning over the past 20 years, particularly after the COVID-19 pandemic years of 2019–2020. Seventeen of the articles included in this review came from 2022. And although the number of publications appears to dip in 2023, we suspect this is due to our cut-off of September 2023 for our review, and that the upward trend in play-based learning studies and publications will continue.

### Settings for play-based learning

As might be expected, the studies skewed towards a focus on younger children, with 55 studies focusing on elementary-aged children, which was defined by the authors as kindergarten through grade five (children aged 5–11), but we also included studies that were self-identified as elementary, even if the grades were above 5th, which typically happened in other countries or in rural settings (e.g., Barekat, 2023; Kangas et al., 2017; Wang Y. et al., 2023; Wang X. et al., 2023).

<sup>2</sup> These articles are listed in a [Supplementary file](#) of references.



Nonetheless, the majority of these 55 elementary studies took place in kindergarten classrooms (children aged 5–6). Surprisingly, the next most common educational setting was in post-secondary education, with 23 studies. Middle school settings (youth aged 12–14) were only seen in studies that examined play across several grade levels (e.g., Gouseti et al., 2020; Qvortrup et al., 2023). See Figure 4 for more details.

In terms of academic content areas, the bulk of the studies described play-based learning quite generally, with this type of learning happening in multiple content areas (see Table 1). The most common specific academic content areas described were math and science, with 12 and 11 studies, respectively. Also noteworthy was that play-based learning is being implemented in teacher education, with eight studies taking place in this post-secondary setting.

## Methodologies for studies on play-based learning

The vast majority of the studies in this review were qualitative, with 63 studies reporting this overarching methodology. Thirteen studies were purely quantitative, and 11 used mixed methods. Specific qualitative data collection methods used most frequently were interviews, observations, and video to either observe interactions at a later date or elicit responses during an interview. Quantitative data collection often took place via surveys and instruments such as the Multidimensional Social Competence Scale (Wang Y. et al., 2023; Wang X. et al., 2023), the Fun Toolkit (Mostowfi et al., 2016), and researcher- or teacher-created pre- and post-tests of knowledge (e.g., Barekat, 2023; Randolph et al., 2016; Wang and Hung, 2010). Collectively, these findings demonstrate that there are many ways to empirically explore play-based learning, yet qualitative inquiry is most common.

## Play conceptualization as choice, wonder, and delight

As previously mentioned, our conceptualization of play was based on The Pedagogy of Play Research Team's (Mardell et al., 2016) indicators of choice, wonder, and delight which were later adopted by other researchers and educational organizations. During the data extraction process, we tracked representation of these indicators using suggested synonyms for choice, wonder, and delight. These findings are based on the representation of these constructs within the data set of articles.

Nearly all of the articles mentioned choice or student autonomy as a key part of play, although it was not always clear to what extent students had opportunities for choice. For example, if the play-based learning centered around a game, there could be quite a range of choice depending on the particular gameplay, including strategies and plot. Quite often, the words “student-guided” or “student-led” were used to describe student choice (e.g., MacDonald and Breunig, 2018; Pyle and Bigelow, 2014). The word “voluntary” was also frequently used as an indicator for choice for the initial engagement in play but may not necessarily connote choice throughout the play activity. As indicated in our methodology section, several studies discussed elements of “free play” indicating a high amount of student choice, but without specific teacher objectives or associated standards, these were not included in our final review.

Wonder is a complex construct, difficult to fully define, and has historically been misunderstood particularly within the context of education (Hadzigeorgiou, 2021; Pederson, 2020). Within the context of play, wonder involves fascination, novelty, surprise, curiosity, and imagination (Mardell et al., 2016). These words, among others, supported our analysis of play-based learning studies

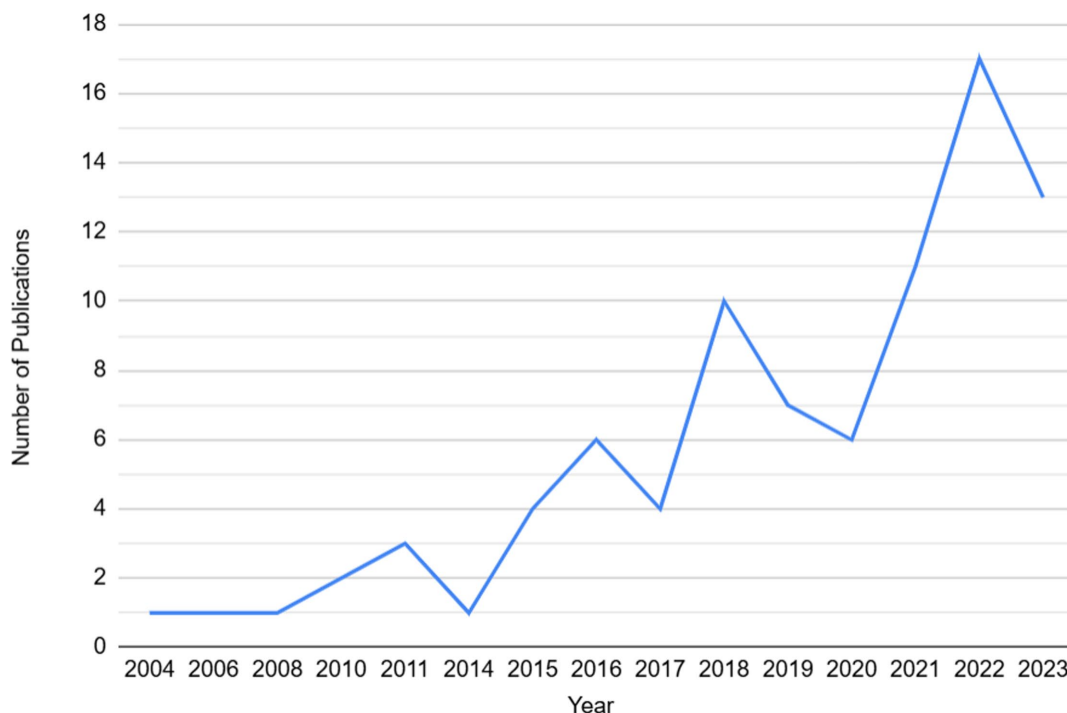


FIGURE 4 Number of play-based learning articles published per year.

TABLE 1 Content areas represented in play-based learning articles.

Content areas	Count	Percentage
Multiple/general	30	34.5
Math	12	13.8
Science	11	12.6
Education	8	9.2
English language arts	7	8.0
Social-emotional learning	4	4.6
Engineering	4	4.6
Computer Science	3	3.4
Arts	3	3.4
Research	1	1.1
Business	1	1.1
Medicine	1	1.1
English language	1	1.1
History	1	1.1
Totals	87	100.0

and the ways in which they represented wonder as an important part of play. Terms related to imaginary or pretend play (e.g., Jayman and Ventouris, 2020; Tam, 2021; Vogt et al., 2018) were quite frequent when describing wonder in K-5 settings. Terms like “explore” (e.g., Johnston et al., 2023; Macdonald et al., 2022) or “discover” (Morgan and Kennewell, 2006; Whitton and Langan, 2019) were often seen in elementary as well as older grade levels. Similar to the concept of choice, there was not much clarity

regarding the extent to which wonder was involved within the playful learning activities.

Delight, as an indicator of play, was mostly represented through the words “joy,” “enjoyment,” and/or “fun.” Compared to the other two indicators, delight was most explicitly delineated within the articles. Oftentimes representation of delight was in reference to student oral responses when participants were interviewed about the play activity or found in written reflections on the playful learning experience. For example, Miller (2018) noted that children in the study wore headsets to focus on their own iPad learning games so they would not be distracted by “giggles and exclamations coming from their peers” (p. 7). Similarly, Paxton (2022) describes participants in her study as “smiling and laughing, being surprised, or joking” (p. 162). Teachers also frequently mentioned that play-based learning is “fun” or “enjoyed” by their students, suggesting that educators are highly cognizant of the role delight has within the act of play.

Collectively, nearly all of the articles were aligned with the notion of play including choice, wonder, and delight. However, some articles were more aligned with this notion than others based on the representation of the play indicators.

### Geographic locations represented

Several countries, including Canada, the United States, and the United Kingdom, have made curricular changes in the past decade requiring play-based learning in kindergarten classrooms (Pyle et al., 2017). It is no coincidence, then, that the countries most often seen in our review are Canada (15 studies), the United States (10 studies), and the United Kingdom (9 studies). However, it should be noted that Pyle and colleagues (e.g., Danniels and Pyle, 2023a, 2023b; Prioletta and Pyle,



2017; Pyle and Alaca, 2018; Pyle and Bigelow, 2014; Pyle et al., 2017, 2018a, 2018b, 2020, 2022) are prolific researchers of play-based learning and hail from Canada which contributed to the significant representation of Canada in this review. Nevertheless, it is encouraging that play-based learning is being studied by a variety of researchers around the globe, from Austria to Brazil, Iran to Timor-Leste (see Table 2 for details).

Given the broad geographic representation of play-based learning studies, we sought to explore any patterns that arose related to conceptions or enactments of play. For example, the studies taking place in Hong Kong all described the tensions between national, historical notions of a play/learning dichotomy as teachers embarked on implementing play-based learning that was suggested in the 2006 and 2017 Hong Kong curriculum guides. Cheng (2011) observed,

Creativity education was imposed by Asian governments for the purpose of increasing competitive power of nations. This kind of educational reform has a danger of putting too much emphasis on product-based and high-end achievements, and not fully addressed [sic] the basic development needs of students... (p. 83).

As might be expected based on this statement, the play-based learning in these Hong Kong studies were towards the teacher-directed end of the play-based learning continuum (Figure 1), using

TABLE 2 Geographic location of play-based learning studies.

Country	Number of studies	Percentage of studies
Australia	7	8.0
Brazil	1	1.1
Canada	15	17.2
China	2	2.3
Denmark	7	8.0
Finland	3	3.4
Greece	1	1.1
Hong Kong	5	5.7
Indonesia	2	2.3
Iran	2	2.3
Multiple Countries	5	5.7
Netherlands	2	2.3
New Zealand	3	3.4
Palestine	1	1.1
Serbia	1	1.1
Singapore	1	1.1
South Africa	2	2.3
Spain	2	2.3
Switzerland	2	2.3
Taiwan	3	3.4
Timor-Leste	1	1.1
United Kingdom	9	10.3
United States	10	11.5
Totals	87	100.0

board games (e.g., Wang and Hung, 2010), teacher-led strategies like engaging in modeling or making predictions (Cheng, 2011), or discussing how it was quite difficult for teachers to put a play-based pedagogy into actual practice (e.g., Pui-Wah and Stimpson, 2004). In the same vein, the Mohamed and Kandeel (2023) study taking place in Egypt and Saudi Arabia described a highly teacher-led activity in which students were 'playing' with 2D and 3D paper shapes in a structured manner by creating a paper cube, touching the faces of the cube, and numbering the faces of the cube.

Conversely, descriptions of play in the Netherlands, Denmark, and Finland were often collaborative, involving co-design of games or environments (e.g., Boysen et al., 2022; Kangas, 2010; Marchetti, 2021). Perhaps because of these collaborations and co-designs, play-based learning was typically more towards the student-led end of the continuum, such as children playing with animal figurines to learn facts about a savannah environment (Verver et al., 2020), preservice teachers engaging in and creating role-play games (Boysen et al., 2023), and children playing a social skills game to build an item of their choosing using toy bricks (Paldam et al., 2022). Playful Learning Environments (computerized, gamified playgrounds in which children can physically move and interact with equipment to learn various content) were also seen in a handful of studies from these countries (de Koning-Veenstra et al., 2014; Kangas, 2010; Kangas et al., 2017; Randolph et al., 2016). Overall, studies from these Nordic countries appeared to conceptualize play-based learning as providing a great deal of choice, high levels of collaboration, and encouraging participant input into these activities.

## Modalities of play

Regardless of geography, we came across multiple modalities of playful learning represented within the empirical studies that spanned kindergarten through higher education. These modalities—the way in which play was actualized within the educational setting—overlap considerably, yet we see the value in highlighting patterns we found connected to the particular way play-based learning manifested itself within the classroom.

The idea of *functional play* and *symbolic play* as distinct types was originally conceived of Piaget (1962) and has since been expanded upon by various scholars. Functional play involves a child using an object for what it is intended (a car is a car) whereas symbolic play incorporates pretend (a banana is a telephone; Lewis et al., 2000). Both modalities of play were evident within the studies we analyzed, particularly in the elementary level, which makes sense considering the typical stages of cognitive and social development that children go through as they grow. There was also evidence of an overlap between functional and symbolic play through the use of engineering tools such as LEGO, blocks, and math manipulatives (e.g., Paxton, 2022; van der Aalsvoort and Broadhead, 2016). Pretend play, which included drama, dress-up, and imagination, was also a common modality within play-based learning (e.g., Scoarize et al., 2022; Woodard et al., 2023) as was physical play which incorporated whole-body movement (e.g., Aslan et al., 2022; de Koning-Veenstra et al., 2014).

The most common modality of play-based learning was game-based; about 30% (26 total) studies used games as the primary component of playful learning. These games included table-top strategy games (e.g., Wang and Hung, 2010), story-driven board

games (e.g., Malegiannaki et al., 2021), physically-active games (e.g., Bustamante et al., 2022) and games using some type of technology platform (e.g., Ardi and Rianita, 2022). In fact, there appears to be a growing interest in using technology platforms to support learning in a playful way. And although technology was frequently paired with games in these studies, there were applications of technology in a non-game approach, such as using a publishing program to playfully design a curricular-related project (e.g., Choi et al., 2019) or incorporating video cameras to record an artistic presentation (e.g., Woodard et al., 2023).

Perhaps one of the most surprising findings on the modalities of play was related to nature-based play. Only two articles (Boysen et al., 2022; MacDonald and Breunig, 2018) described studies connecting play to nature. Boysen et al. (2022) asked groups of adults to design and build treehouses in nearby woods while MacDonald and Breunig (2018) described a kindergarten classroom that merged play and inquiry within an outdoor setting. Anecdotally, we noticed that many of the preschool play-based empirical studies were centered on nature-based play, but these were not included within our final list of articles due to the preschool setting.

## Discussion and directions for future research

The purpose of this meta-synthesis was to illuminate patterns within the preexisting work on play-based learning and to identify areas for future contributions. First, we provide insights into the patterns that developed, elaborating on *where* and *with whom* play is being implemented within formal K-13+ educational settings. Next, we discuss *how* play is effectively integrated into learning as evidenced within the literature, contributing a fresh perspective to the field's understanding of play-based learning.

### Where is play-based learning being implemented?

The studies we examined were concentrated in North America and Europe, highlighting a need for greater geographic diversity. However, the fact that so many journals and countries were represented in the meta-synthesis, as well as the fact that the number of publications per year appear to be steadily increasing, is encouraging. This is an indication that many educators across the globe recognize the importance of play and the opportunities for rigorous learning to happen through play. However, since this meta-synthesis includes only empirical studies published in English, we recommend that future research explore play-based education literature in other languages to provide a more comprehensive representation of where play is being integrated into education globally.

### With whom is play-based learning being implemented?

A key contribution of this meta-synthesis is the analysis of play-based learning across grade levels, whereas other work in the field predominantly focuses on early childhood or elementary educational

settings. Taking into account K-13+ learning environments revealed the unequal representations amongst grade/age levels. Over 60% of the studies in our meta-synthesis took place at the elementary level (ages 5–11). The second-highest age group was post-secondary (ages 18+), with over 25% of the studies in this category, but this is likely due to the fact that many preservice and inservice teachers were engaging in play-based learning themselves in order to implement playful pedagogies in their own classrooms (e.g., Boysen et al., 2023; Galbraith, 2022; Morgan and Kennewell, 2006). Alternatively, perhaps educators in post-secondary settings feel a bit more freedom in how they teach, given that there are rarely standardized curricula/pacing guides at the post-secondary level. Returning to our assertions at the beginning of this review, play is a basic human right (Parker et al., 2022; United States Play Coalition, 2023) and research has demonstrated that humans learn best when they are actively involved in meaningful, social, and joyful learning experiences (Zosh et al., 2017). We would argue this is true for people of any age, and continue the call from Lee et al. (2022) and Parker and Thomsen (2019) to study play-based learning in adolescents (children ages 12–18) as well as adults. The findings from this meta-synthesis point towards the scarcity of publications on play-based learning with adolescents, suggesting that middle school and secondary educators leverage play as a valuable component of lifelong learning.

### How is play-based learning being implemented?

Our meta-synthesis was unique in that it framed play through the lens of choice, wonder, and delight whereas other literature reviews looked solely at one aspect of play-based learning (e.g., game-based approaches) or failed to conceptualize play within educational settings. Although our goal was not to evaluate the degree in which empirical play-based learning research incorporates choice, wonder, and delight, it was enlightening to track the representation of these play indicators. We agree with The Pedagogy of Play Research Team (Mardell et al., 2016) in that these indicators are subjective in nature and not finite, binary categories. Rather than merely serving as a checklist for play-based learning, we posit that choice, wonder, and delight become opportunities for expanding our conception of play within a K-13+ setting and should be an integral component of the playful learning experience. Future research should look at ways to maximize these three indicators for play-based learning, taking into account unique cultural contexts as well. Additionally, we encourage researchers to be much more explicit in their definitions of play and play-based learning (and its components of choice, wonder, and delight) and the extent to which participants are engaging in these hallmarks of play. As discussed earlier, it was often difficult to ascertain the scope of participants' autonomy, for example, when playing a game, or their delight in manipulating a toy—and whether or not these were purposeful goals of the researchers or intervention. In order to continue building notions of play-based learning, studies must be much more transparent in these respects.

As described above, there appears to be a growing interest in using technology platforms to support learning in a playful way. The equipment and applications typically cost money and are not always readily available to teachers. For example, the digital Playful Learning

Environments such as those described in [Randolph et al. \(2016\)](#) and [Kangas \(2010\)](#) require physical installations of equipment on school grounds as well as the purchase of accompanying software. [Miller's \(2018\)](#) study involved iPads placed around the room. This leads us to consider the accessibility and inclusivity of this technology-supported play-based learning. While there were, indeed, studies in this meta-synthesis that involved technology *and* participants who were from traditionally-marginalized populations (e.g., [Wang Y. et al., 2023](#); [Wang X. et al., 2023](#); [Woodard et al., 2023](#)), we would encourage researchers to consider the wider applicability of interventions supporting play-based learning. For example, [Hakkarainen's \(2008\)](#) study focused on learning through a “playworld” based on the story of *Rumpelstiltskin*. Different learning objectives were taught through dramatized portions of the story and play episodes between adults/actors and the children. We see this type of play-based learning as not only inclusive financially speaking, but also in the fact that teachers could choose any number of stories or myths that are locally and/or culturally relevant to students. These types of play-based pedagogies allow for more students to meaningfully engage in this type of learning and we would welcome future research that explores play-based learning interventions taking place in a variety of contexts.

Perhaps connected to this previous point, we were astounded at the lack of nature-based play-based learning in the studies reviewed. Conceivably this is due to the fact that we did not review studies in preschool settings and there is a prevalence of playful nature-based learning within contexts such as Forest Schools or Bush Kinders. We also recognize that only analyzing studies published in English potentially excludes many nature-based play-based learning articles, such as those often found within Northern European cultures (see [Dean, 2019](#)) and yet, given the broad geographic locations of studies in this meta-synthesis the dearth of nature-based play-based learning is a noticeable silence. It is encouraging to note that outdoor play *is* happening and being explored within empirical research, as indicated by [Lee et al.'s \(2022\)](#) recent synthesis. However, it should be noted that Lee et al.'s synthesis included several studies that discussed free play rather than play tied to learning, and also included playing in outdoor spaces, which could include playing on playground equipment or using technology-based equipment such as Playful Learning Environments ([Kangas, 2010](#)). This is not to say that free play and/or outdoor play on equipment is unimportant; rather, it demonstrates a need for future research to fully explore studies and possibilities within the natural environment as K-13+ learning spaces. This finding is particularly relevant given that opportunities for children to engage in free, unstructured outdoor play have declined over the years due to a variety of factors, including family and societal trends ([Beaulieu and Beno, 2024](#)). Nature-based play-based learning in formal school settings can serve as a way to counteract diminishing engagement in outdoor play.

We believe the findings of this meta-synthesis will be valuable to both scholars and practitioners. By identifying patterns within the play-based learning literature, we synthesize existing research while highlighting areas that warrant further exploration. We encourage scholars to continue examining the gaps within the field so as to further develop the understanding of play's integration into formal K-13+ settings. For practitioners, this synthesis offers concrete examples of how play can be integrated into formal learning environments, including game-based approaches, technology platforms, storyworlds, and nature-based activities. Additionally, our review of empirical work includes frameworks that can guide educators in incorporating play

into their classrooms. For example, teachers might consider how to foster choice, wonder, and delight in playful learning experiences or explore ways to move along the continuum of play during instruction. Ultimately, by mapping the key themes in play-based learning research, this meta-synthesis provides educators with a roadmap for enhancing student engagement and learning through play.

## Limitations

As with any review that has inclusion and exclusion criteria, there are limitations to this study. Our decision to exclude studies at the preschool level (prior to age 5/kindergarten) may have influenced our findings. Further, it may provide the impression that play-based learning is *not* happening at the preschool level. On the contrary, we are sure that rigorous, play-based learning is possible at the preschool level. However, we felt it important that educators were explicitly considering specific learning objectives to be considered play-based learning, and this is much more explicit when there are mandated teaching and learning standards.

Additionally, we did not include any studies in which teachers' perceptions, opinions, or beliefs about play-based learning were the focus (unless the study *also* reported actual implementation of play-based learning). Once again, we do not wish to provide the impression that this is unimportant. Rather, it was our aim to describe enactments of play-based learning rather than thoughts about this approach. As was seen in several studies (e.g., [Pui-Wah and Stimpson, 2004](#); [Pyle et al., 2018a, 2018b](#)), what educators *hoped* to implement and what they *actually* implemented in their classrooms often differed, with educators quite frequently unable to achieve their intentions.

We did not conduct a risk of bias assessment for this study in relation to the screening and analysis. Rather, we worked closely together and discussed any issues and questions that arose. This methodology was chosen because we were interested in crafting a broad foundation for patterns of play-based learning implementation and were as open as possible in terms of including articles (within parameters) and examining implementation components. As such, we feel the bias risk to be low and have confidence in the broad patterns that are described here.

Finally, while we cast a broad net with our database search parameters, it is always possible that something was missed, either due to a study not being indexed or not quite aligning with our search terms. Nevertheless, the fact that the initial search yielded 1,475 records gives us reason to be confident that the initial search parameters were fruitful.

## Conclusion

If our goal is to simply teach students academic content, then play-based learning can be an effective and engaging way to do so. If our goal is broader, however, and incorporates a more holistic approach that acknowledges the multi-dimensional nature of an individual's well-being, then play *must* take its rightful place within educational settings regardless of age, subject, or time. This meta-synthesis is a first step towards informing the field and setting an agenda for future research so that we may move towards more joyful teaching, meaningful learning, and wonder-filled moments within our classrooms.

## Author contributions

SD: Writing – original draft, Writing – review & editing. JW: Writing – original draft, Writing – review & editing.

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The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

## References

- Ardi, P., and Rianita, E. (2022). Leveraging gamification into EFL grammar class to boost student engagement. *Teach. English Technol.* 22, 90–114.
- Aslan, S., Agrawal, A., Alyuz, N., Chierichetti, R., Durham, L. M., Manuvinakurike, R., et al. (2022). Exploring kid space in the wild: a preliminary study of multimodal and immersive collaborative play-based learning experiences. *Educ. Technol. Res. Dev.* 70, 205–230. doi: 10.1007/s11423-021-10072-x
- Barekat, N. A. (2023). The effect of play-based learning methods on math learning of sixth-grade elementary students. *Int. J. Curric. Instr.* 15, 98–105.
- Barnett, L. A. (1990). Developmental benefits of play for children. *J. Leis. Res.* 22, 138–153. doi: 10.1080/00222216.1990.11969821
- Barnett, L., and Owens, M. (2015). “Does play have to be playful?” in *The handbook of the study of play*. eds. J. Johnson, S. Eberle, T. Hendricks and D. Kuschner (Rowman and Littlefield), 453–459.
- Beaulieu, E., and Beno, S. (2024). Healthy childhood development through outdoor risky play: navigating the balance with injury prevention. *Paediatr. Child Health* 29, 255–261. doi: 10.1093/pch/pxae016
- Bergen, D. (2002). The role of pretend play in children's cognitive development. *Early Child. Res. Pract.* 4, 1–13.
- Boysen, M. S. W., Knage, M., Egelund, K. S., Lund, O., and Skovbjerg, H. M. (2022). Treehouses and superheroes: a design-based study of psychological ownership in collaborative creativity through exchanges of presents. *Think. Skills Creat.* 46:101198. doi: 10.1016/j.tsc.2022.101198
- Boysen, M. S. W., Lund, O., Jørnø, R. L., and Skovbjerg, H. M. (2023). The role of expertise in playful learning activities: a design-based self-study within teacher education aimed at the development of tabletop role-playing games. *Teach. Teach. Educ.* 128:104128. doi: 10.1016/j.tate.2023.104128
- Bubikova-Moan, J., Næss Hjetland, H., and Wollscheid, S. (2019). ECE teachers' views on play-based learning: a systematic review. *Eur. Early Child. Educ. Res. J.* 27, 776–800. doi: 10.1080/1350293X.2019.1678717
- Bustamante, A. S., Begolli, K. N., Alvarez-Vargas, D., Bailey, D. H., and Richland, L. E. (2022). Fraction ball: playful and physically active fraction and decimal learning. *J. Educ. Psychol.* 114, 1307–1320. doi: 10.1037/edu0000714
- Butler-Kisber, L. (2010). *Qualitative inquiry: Thematic, narrative and arts-informed perspectives*. Thousand Oaks, CA: Sage.
- Cheng, V. M. (2011). Infusing creativity into eastern classrooms: evaluations from student perspectives. *Think. Skills Creat.* 6, 67–87. doi: 10.1016/j.tsc.2010.05.001
- Choi, J. H., Payne, A., Hart, P., and Brown, A. (2019). Creative risk-taking: developing strategies for first year university students in the creative industries. *Int. J. Art Design Educ.* 38, 73–89. doi: 10.1111/jade.12169
- Coates, J. K., and Pimlott, W. H. (2019). Learning while playing: Children's Forest School experiences in the UK. *Br. Educ. Res. J.* 45, 21–40. doi: 10.1002/berj.3491
- Cuiñas, I., Santalla, V., Alejos, A. V., Isasa, M. V., De Lorenzo Rodríguez, E., and Sanchez, M. G. (2011). Playing LEGO mindstorms while learning remote sensing. *Int. J. Eng. Educ.* 27, 571–579.

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## Supplementary material

The Supplementary material for this article can be found online at: <https://www.frontiersin.org/articles/10.3389/feduc.2025.1557001/full#supplementary-material>

Danniels, E., and Pyle, A. (2023a). Inclusive play-based learning: approaches from enacting kindergarten teachers. *Early Childhood Educ. J.* 51, 1169–1179. doi: 10.1007/s10643-022-01369-4

Danniels, E., and Pyle, A. (2023b). Teacher perspectives and approaches toward promoting inclusion in play-based learning for children with developmental disabilities. *J. Early Child. Res.* 21, 288–302. doi: 10.1177/1476718X221149376

Darling-Hammond, L., Schachner, A., Edgerton, A. K., Badrinarayan, A., Cardichon, J., Cookson, P. W. Jr, et al. (2020). *Restarting and reinventing school: learning in the time of COVID and beyond*. Learning Policy Institute. Available at: <http://learningpolicyinstitute.org/product/restarting-reinventing-school-covid> (Accessed December 9, 2023)

de Koning-Veenstra, B., Steenbeek, H. W., van Dijk, M. W. G., and van Geert, P. L. C. (2014). Learning through movement: a comparison of learning fraction skills on a digital playful learning environment with a sedentary computer-task. *Learn. Individ. Differ.* 36, 101–109. doi: 10.1016/j.lindif.2014.10.002

Dean, S. N. (2019). Seeing the forest and the trees: A historical and conceptual look at Danish forest schools. *Int. J. Early Childhood Environ. Educ.* 6, 53–63.

Diamond, A., and Lee, K. (2011). Interventions shown to aid executive function development in children 4 to 12 years old. *Science* 333, 959–964. doi: 10.1126/science.1204529

Eberle, S. G. (2014). The elements of play: toward a philosophy and definition of play. *Am. J. Play* 6, 214–233. Available at: <https://files.eric.ed.gov/fulltext/EJ1023799.pdf>

Fisher, K., Hirsh-Pasek, K., Golinkoff, R. M., Singer, D. G., and Berk, L. (2011). “Playing around in school: implications for learning and educational policy” in *The Oxford handbook of the development of play*. ed. A. D. Pellegrini (New York, New York: Oxford University Press), 341–360.

Fleer, M. (2011). ‘Conceptual play’: foregrounding imagination and cognition during concept formation in early years education. *Contemp. Issues Early Child.* 12, 224–240. doi: 10.2304/ciec.2011.12.3.224

Frost, J. L. (2009). *A history of children's play and play environments: Toward a contemporary child-saving movement* New York, New York: Taylor and Francis Group.

Galbraith, J. (2022). “A prescription for play”: developing early childhood preservice teachers' pedagogies of play. *J. Early Child. Teach. Educ.* 43, 474–494. doi: 10.1080/10901027.2022.2054035

Gouseti, A., Abbott, D., Burden, K., and Jeffrey, S. (2020). Adopting the use of a legacy digital artefact in formal educational settings: opportunities and challenges. *Technol. Pedagog. Educ.* 29, 613–629. doi: 10.1080/1475939X.2020.1822435

Gray, P. (2015). “Studying play without calling it that: humanistic and positive psychology” in *The handbook of the study of play*. eds. J. Johnson, S. Eberle, T. Hendricks and D. Kuschner (Lanham, Maryland: Rowman and Littlefield), 121–138.

Hadzigeorgiou, Y. (2021). Students' reactions to natural and physical phenomena: documenting wonder and engagement with science content knowledge. *Interdiscip. J. Environ. Sci. Educ.* 18:e2261. doi: 10.21601/ijese/11340

- Hakkaraian, P. (2008). The challenges and possibilities of a narrative learning approach in the Finnish early childhood education system. *Int. J. Educ. Res.* 47, 292–300. doi: 10.1016/j.ijer.2008.12.008
- Hirsh-Pasek, K., Hadani, H., Blinkoff, E., and Golinkoff, R. M. (2020). *A new path to education reform: playful learning promotes 21st century skills in school and beyond*. The Brookings Institution. Available at: <https://www.brookings.edu/articles/a-new-path-to-education-reform-playful-learning-promotes-21st-century-skills-in-schools-and-beyond/> (Accessed November 12, 2023).
- Isenberg, J. P., and Quisenberry, N. (2002). A position paper of the Association for Childhood Education International, PLAY: essential for all children. *Child. Educ.* 79, 33–39. doi: 10.1080/00094056.2002.10522763
- Jayman, M., and Ventouris, A. (2020). Dealing children a helping hand with book of beasts: the mental wellness card game. *Educ. Child Psychol.* 37, 69–80. doi: 10.53841/bpsecp.2020.37.4.69
- Johnston, O., Wildy, H., and Shand, J. (2023). Teenagers learn through play too: communicating high expectations through a playful learning approach. *Aust. Educ. Res. (Springer Science and Business Media B.V.)* 50, 921–940. doi: 10.1007/s13384-022-00534-3
- Kangas, M. (2010). Creative and playful learning: learning through game co-creation and games in a playful learning environment. *Think. Skills Creat.* 5, 1–15. doi: 10.1016/j.tsc.2009.11.001
- Kangas, M., Siklander, P., Randolph, J., and Ruokamo, H. (2017). Teachers' engagement and students' satisfaction with a playful learning environment. *Teach. Teach. Educ.* 63, 274–284. doi: 10.1016/j.tate.2016.12.018
- King, J., Hill, K., and Gleason, A. (2015). All the world's a stage: evaluating psychiatry role-play based learning for medical students. *Australas. Psychiatry* 23, 76–79. doi: 10.1177/1039856214563846
- Leary, H., and Walker, A. (2018). Meta-analysis and meta-synthesis methodologies: rigorously piecing together research. *TechTrends* 62, 525–534. doi: 10.1007/s11528-018-0312-7
- Lee, E.-Y., de Lannoy, L., Li, L., de Barros, M. I. A., Bentsen, P., Brussoni, M., et al. (2022). Play, learn, and teach outdoors—network (PLaTO-net): terminology, taxonomy, and ontology. *Int. J. Behav. Nutr. Phys. Act.* 19:66. doi: 10.1186/s12966-022-01294-0
- Levine, S., Ratliff, K., Huttenlocher, J., and Cannon, J. (2012). Early puzzle play: a predictor of preschoolers' spatial transformation skill. *Dev. Psychol.* 48, 530–542. doi: 10.1037/a0025913
- Lewis, V., Boucher, J., Lupton, L., and Watson, S. (2000). Relationships between symbolic play, functional play, verbal and non-verbal ability in young children. *Int. J. Lang. Commun. Disorders* 35, 117–127. doi: 10.1080/136828200247287
- MacDonald, K., and Breunig, M. (2018). Back to the Garden: Ontario kindergarteners learn and grow through schoolyard pedagogy. *J. Outdoor Environ. Educ.* 21, 133–151. doi: 10.1007/s42322-018-0011-z
- Macdonald, I., Malone, E., and Firth, R. (2022). How can scientists and designers find ways of working together? A case study of playful learning to co-design visual interpretations of immunology concepts. *Stud. High. Educ.* 47, 1980–1996. doi: 10.1080/03075079.2021.2020745
- Mainella, F. P., Agate, J. R., and Clark, B. S. (2011). Outdoor-based play and reconnection to nature: a neglected pathway to positive youth development. *New Dir. Youth Dev.* 2011, 89–104. doi: 10.1002/yd.399
- Malegiannaki, I., Daradoumis, T., and Retalis, S. (2021). Using a story-driven board game to engage students and adults with cultural heritage. *Int. J. Game-Based Learn.* 11, 1–19. doi: 10.4018/IJGBL.2021040101
- Marchetti, E. (2021). Are they playing? Analysing “play” in playful learning in occupational therapy education. *E-Learn. Digital Media* 18, 290–306. doi: 10.1177/2042753020980114
- Mardell, B., Donaldson, M., and Henderson, B. (2023). Playing to learn in an urban, public school: an introduction to two teacher narratives. *Young Children* 78:60.
- Mardell, B., Wilson, D., Ryan, J., Ertel, K., Krechevsky, M., and Baker, M. (2016). *Towards a pedagogy of play* (a project zero working paper). Available at: <https://pz.harvard.edu/sites/default/files/Towards%20a%20Pedagogy%20of%20Play.pdf> (Accessed January 3, 2023).
- Maxwell, J. A. (2013). *Qualitative research design: An interactive approach*. Thousand Oaks, CA: SAGE Publications, Inc.
- Miller, T. (2018). Developing numeracy skills using interactive technology in a play-based learning environment. *Int. J. STEM Educ.* 5:39. doi: 10.1186/s40594-018-0135-2
- Miller, N., Kumar, S., Pearce, K., and Baldock, K. (2022). Primary school educators' perspectives and experiences of nature-based play and learning and its benefits, barriers, and enablers: a qualitative descriptive study. *Int. J. Environ. Res. Public Health* 19:3179. doi: 10.3390/ijerph19063179
- Mohamed, D. A., and Kandeel, M. M. (2023). Playful learning: teaching the properties of geometric shapes through pop-up mechanisms for kindergarten. *Int. J. Educ. Math. Sci. Technol.* 11, 179–197. doi: 10.46328/ijemst.2921
- Moher, D., Liberati, A., Tetzlaff, J., and Altman, D. G. (2010). Preferred reporting items for systematic reviews and meta-analyses: the PRISMA statement. *Int. J. Surg.* 8, 336–341. doi: 10.1016/j.ijsu.2010.02.007
- Morgan, A. E., and Kennewell, S. E. (2006). Initial teacher education students' views on play as a medium for learning—a divergence of personal philosophy and practice. *Technol. Pedagog. Educ.* 15, 307–320. doi: 10.1080/14759390600923691
- Mostowfi, S., Mamaghani, N. K., and Khorramar, M. (2016). Designing playful learning by using educational board game for children in the age range of 7–12: (a case study: recycling and waste separation education board game). *Int. J. Environ. Sci. Educ.* 11, 5453–5476.
- NAEYC. (2020). *Developmentally appropriate practice* [position statement]. Available at: [https://www.naeyc.org/sites/default/files/globally-shared/downloads/PDFs/resources/position-statements/dap-statement\\_0.pdf](https://www.naeyc.org/sites/default/files/globally-shared/downloads/PDFs/resources/position-statements/dap-statement_0.pdf) (Accessed November 12, 2023).
- Nesbitt, K. T., Blinkoff, E., Golinkoff, R. M., and Hirsh-Pasek, K. (2023). Making schools work: an equation for active playful learning. *Theory Pract.* 62, 141–154. doi: 10.1080/00405841.2023.2202136
- Owens, J. (2021). Systematic reviews: brief overview of methods, limitations, and resources. *Nurse Author Editor* 31, 69–72. doi: 10.1111/nae.2.28
- Paldam, E., Roepstorff, A., Steensgaard, R., Lundsgaard, S. S., Steensig, J., and Gebauer, L. (2022). A robot or a dumper truck? Facilitating play-based social learning across neurotypes. *Autism Dev. Lang. Impair.* 7, 1–12. doi: 10.1177/23969415221086714
- Parker, R., and Thomsen, B. S. (2019). *Learning through play at school: a study of integrated pedagogies that foster children's holistic skills development in the primary school classroom* [white paper]. The LEGO Foundation. Available at: [https://research.acer.edu.au/cgi/viewcontent.cgi?article=1023&context=learning\\_processes](https://research.acer.edu.au/cgi/viewcontent.cgi?article=1023&context=learning_processes) (Accessed October 30, 2023).
- Parker, R., Thomsen, B. S., and Berry, A. (2022). Learning through play at school – a framework for policy and practice. *Front. Educ.* 7:751801. doi: 10.3389/feduc.2022.751801
- Paxton, K. (2022). Play and write: a guided-play writing workshop in a South African classroom. *Am. J. Play* 14, 149–172.
- Pederson, J. B. W. (2020). “The importance of wonder in human flourishing” in Wonder, education, and human flourishing: Theoretical, empirical, and practical perspectives. ed. A. Schinkel (Amsterdam: VU University Press).
- Piaget, J. (1962). *Play, dreams and imitation in childhood* New York, New York: Norton.
- Pramling Samuelsson, I., and Björklund, C. (2023). The relation of play and learning empirically studied and conceptualised. *Int. J. Early Years Educ.* 31, 309–323. doi: 10.1080/09669760.2022.2079075
- Prioletta, J., and Pyle, A. (2017). Play and gender in Ontario kindergarten classrooms: implications for literacy learning. *Int. J. Early Years Educ.* 25, 393–408. doi: 10.1080/09669760.2017.1390446
- Pui-Wah, D. C., and Stimpson, P. (2004). Articulating contrasts in kindergarten teachers' implicit knowledge on play-based learning. *Int. J. Educ. Res.* 41, 339–352. doi: 10.1016/j.ijer.2005.08.005
- Pyle, A., and Alaca, B. (2018). Kindergarten children's perspectives on play and learning. *Early Child Dev. Care* 188, 1063–1075. doi: 10.1080/03004430.2016.1245190
- Pyle, A., and Bigelow, A. (2014). Play in kindergarten: an interview and observational study in three Canadian classrooms. *Early Childhood Educ. J.* 43, 385–393. doi: 10.1007/s10643-014-0666-1
- Pyle, A., and Danniels, E. (2017). A continuum of play-based learning: the role of the teacher in play-based pedagogy and the fear of hijacking play. *Early Educ. Dev.* 28, 274–289. doi: 10.1080/10409289.2016.1220771
- Pyle, A., DeLuca, C., and Danniels, E. (2017). A scoping review of research on play-based pedagogies in kindergarten education. *Rev. Educ.* 5, 311–351. doi: 10.1002/rev3.3097
- Pyle, A., DeLuca, C., Danniels, E., and Wickstrom, H. (2020). A model for assessment in play-based kindergarten education. *Am. Educ. Res. J.* 57, 2251–2292. doi: 10.3102/0002831220908800
- Pyle, A., DeLuca, C., Wickstrom, H., and Danniels, E. (2022). Connecting kindergarten teachers' play-based learning profiles and their classroom assessment practices. *Teach. Teach. Educ.* 119, 103855–103812. doi: 10.1016/j.tate.2022.103855
- Pyle, A., Poliszczuk, D., and Danniels, E. (2018a). The challenges of promoting literacy integration within a play-based learning kindergarten program: teacher perspectives and implementation. *J. Res. Child. Educ.* 32, 219–233. doi: 10.1080/02568543.2017.1416006
- Pyle, A., Prioletta, J., and Poliszczuk, D. (2018b). The play-literacy interface in full-day kindergarten classrooms. *Early Childhood Educ. J.* 46, 117–127. doi: 10.1007/s10643-017-0852-z
- Qvortrup, A., Lomholt, R., Christensen, V., Lundtofte, T. E., and Nielsen, A. (2023). Playful learning during the reopening of Danish schools after Covid 19 closures. *Scand. J. Educ. Res.* 67, 725–740. doi: 10.1080/00313831.2022.2042850
- Rand, M., and Morrow, L. (2021). The contribution of play experiences in early literacy: expanding the science of reading. *Read. Res. Q.* 56, S239–S248. doi: 10.1002/rrq.383
- Randolph, J. J., Kangas, M., Ruokamo, H., and Hyvönen, P. (2016). Creative and playful learning on technology-enriched playgrounds: an international investigation. *Interact. Learn. Environ.* 24, 409–422. doi: 10.1080/10494820.2013.860902
- Roopnarine, J. L. (2015). “Play as culturally situated: diverse perspectives on its meaning and significance” in Children's play in international perspective. eds. J. L. Roopnarine, M. Patte, J. E. Johnson and D. Kuschner (New York: Open University Press/McGraw Hill).

- Scalise, N., Daubert, E., and Ramani, G. (2019). Benefits of playing numerical card games on head start children's mathematical skills. *J. Exp. Educ.* 88, 200–220. doi: 10.1080/00220973.2019.1581721
- Soarize, M. M. R., Contieri, B. B., Delanira-Santos, D., Zanco, B. F., and Benedito, E. (2022). An interdisciplinary approach to address aquatic environmental issues with young students from Brazil. *Int. Res. Geogr. Environ. Educ.* 31, 38–52. doi: 10.1080/10382046.2021.1943220
- Skene, K., O'Farrelly, C. M., Byrne, E. M., Kirby, N., Stevens, E. C., and Ramchandani, P. G. (2022). Can guidance during play enhance children's learning and development in educational contexts? A systematic review and meta-analysis. *Child Dev.* 93, 1162–1180. doi: 10.1111/cdev.13730
- Snow, M., Eslami, Z., and Park, J. (2016). English language learners' writing behaviours during literacy-enriched block play. *J. Early Child. Lit.* 18, 189–213. doi: 10.1177/1468798416637113
- Stegelin, D. A., Fite, K., and Wisneski, D. (2015). *The critical place of play in education* [white paper]. US Play Coalition and The Association of Childhood Education International. Available at: <https://usplaycoalition.org/wp-content/uploads/2015/08/PRTM-Play-Coalition-White-Paper.pdf> (Accessed November 12, 2023).
- Tam, P.-C. (2021). Blurring the play–drama boundary: a case study investigating the teaching and learning of a drama-integrated curriculum in a Hong Kong kindergarten. *Contemp. Issues Early Child.* 22, 328–341. doi: 10.1177/14639491211060559
- United Nations [UN]. (1989). Convention on the rights of the child. Available at: <https://www.ohchr.org/en/instruments-mechanisms/instruments/convention-rights-child#:~:text=her%20own%20language,Article%2031,cultural%20life%20and%20the%20arts> (Accessed December 2, 2023).
- United States Play Coalition. (2023). *About US*. US play coalition. Available at: <https://usplaycoalition.org/about-us> (Accessed November 12, 2023).
- van der Aalsvoort, G., and Broadhead, P. (2016). Working across disciplines to understand playful learning in educational settings. *Child. Educ.* 92, 483–493. doi: 10.1080/00094056.2016.1251798
- Verver, S. H., Vervloed, M. P. J., Yuill, N., and Steenbergen, B. (2020). Playful learning with sound-augmented toys: comparing children with and without visual impairment. *J. Comput. Assist. Learn.* 36, 147–159. doi: 10.1111/jcal.12393
- Vogt, F., Hauser, B., Stebler, R., Rechsteiner, K., and Urech, C. (2018). Learning through play - pedagogy and learning outcomes in early childhood mathematics. *Eur. Early Child. Educ. Res. J.* 26, 589–603. doi: 10.1080/1350293X.2018.1487160
- Vygotsky, L. S. (1978). *Mind in society: The development of higher psychological processes*. Cambridge, Massachusetts: Harvard University Press.
- Wang, Z., and Hung, L. (2010). Kindergarten children's number sense development through board games. *Int. J. Learn.* 17, 19–32. doi: 10.18848/1447-9494/CGP/v17i08/47181
- Wang, Y., Li, L., Flee, M., and Ma, Y. (2023). Creating conditions for Chinese kindergarten Teacher's professional development in play-based setting. *Early Years* 44, 665–681. doi: 10.1080/09575146.2023.2205055
- Wang, X., Young, G. W., Plechatá, A., Mc Guckin, C., and Makransky, G. (2023). Utilizing virtual reality to assist social competence education and social support for children from under-represented backgrounds. *Comput. Educ.* 201:104815. doi: 10.1016/j.compedu.2023.104815
- Weisberg, D. S., Hirsh-Pasek, K., and Golinkoff, R. M. (2013). Guided play: where curricular goals meet a playful pedagogy. *Mind Brain Educ.* 7, 104–112. doi: 10.1111/mbe.2013.7.issue-2
- Weisberg, D. S., and Zosh, J. M. (2018). “How guided play promotes early childhood learning” in *Encyclopedia on early childhood development*. eds. R. E. Tremblay, M. Boivin, R. Peters and A. Pyle. <https://www.child-encyclopedia.com/play-based-learning/according-experts/how-guidedplay-promotes-early-childhood-learning>.
- Whitton, N., and Langan, M. (2019). Fun and games in higher education: an analysis of UK student perspectives. *Teach. High. Educ.* 24, 1000–1013. doi: 10.1080/13562517.2018.1541885
- Woodard, R., Diaz, A. R., Phillips, N. C., Varelas, M., Kotler, R., Tsachor, R. P., et al. (2023). I. Am. a. Star.: exploring moments of muchness in children's digital compositional play and embodied science learning. *Engl. Teach. Pract. Critique (Emerald Group Publishing Limited)* 22, 163–176. doi: 10.1108/ETPC-08-2022-0101
- Yogman, M., Garner, A., Hutchinson, J., Hirsh-Pasek, K., and Golinkoff, R. M. (2018). The power of play: a pediatric role in enhancing development in young children. *Pediatrics* 142, 1–16. doi: 10.1542/peds.2018-2058
- Yunianti, S. (2020). *Play-based learning as an essential strategy to face 21st-century learning* [paper presentation]. Proceedings of the 1st international conference on language and language teaching 2019, Magelang, Central Java, Indonesia. doi: 10.4108/eai.12-10-2019.2292213
- Zosh, J. M., Hopkins, E. J., Jensen, H., Liu, C., Neale, D., Hirsh-Pasek, K., et al. (2017). *Learning through play: a review of the evidence*. The LEGO Foundation. doi: 10.13140/RG.2.2.16823.01447