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# Analysis on the Role of Picture Books in Children's Cognitive Development Education

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	Abstract
Article History Article Submission 12 July 2023 Revised Submission 24 August 2023 Article Accepted 19 September 2023	Picture books have been a staple in children's literature for centuries, with the earliest known examples dating back to the 15th century. These books are designed to engage young readers through a combination of words and pictures, to develop literacy skills and promote cognitive development. Picture books are an important tool for teaching young children new words and concepts as well as providing them with education. Numerous studies have investigated the effects that reading aloud together has on the relationships that develop between parents and children. A brand-new line of research has recently been initiated to investigate the qualities of children's picture books that encourage learning and the application of that education in the wider world. Children's symbolic development, analogical reasoning, and thinking that is rooted in fantasy may impede their ability to retrieve information from picture books, according to the findings of the research presented here. After that, we take a look at the developing corpus of research on the effect of picture book characteristics on children's learning and transfer of scientific concepts, problem-solving skills, morals, and words and letters from picture books. In each area of learning, we investigate how the development of children might interact with the qualities of books in order to influence their acquisition of knowledge. We come to the conclusion that the ability of children to learn and transfer knowledge from picture books can be hampered by certain book qualities, and that future research should examine the interplay between the developing capacities of children and the characteristics of books and how they affect their learning. <b>Keywords:</b> Picture Book; Cognitive Development; Early Childhood Education; Visual Literacy; Storytelling

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## Introduction

Children's literature that takes the form of picture books tells a story through the use of both text and pictures to communicate the tale. Mostly geared for younger children, they are intended to be aesthetically appealing and simple to comprehend in order to attract their attention.

There are a few distinct categories of picture books, the most common of which are board books for infants, picture storybooks for younger children, and illustrated chapter books for older children. Picture books can be either works of fiction or non-fiction, and they can be about a wide variety of subjects, ranging from bedtime tales to educational subjects like physics and history. The provision of a helpful resource for the intellectual growth of youngsters is one of the primary reasons why picture books are of such importance. They are beneficial to the development of linguistic abilities, literacy skills, visual literacy, imagination, critical thinking, the art of storytelling, creativity, emotional growth, social abilities, and cultural variety. They provide a multimodal learning experience by mixing visual and textual information, and they can assist with the development of reading comprehension, vocabulary, and phonemic awareness.

In the context of education, the use of picture books as a pedagogical tool to enhance the growth of children's cognitive abilities is possible. Gavran et al. (2023) suggest that visual experience can affect the formation of personal character and creativity. In order to improve students' overall educational experiences and outcomes, it is the responsibility of teachers to pick suitable picture books and include them in lesson plans. To further encourage active participation and engagement on the part of students, the use of teaching tools such as puppets, felt boards, and other visual aids can be used with the reading of picture books. The purpose of this investigation is to investigate the function that picture books serve in the education of children's cognitive development. In particular, the purpose of this study is to investigate how children's picture books can assist in the development of a child's capacity for language acquisition, literacy skills, visual literacy, critical thinking, imagination, and emotional growth. In addition, the purpose of the study is to investigate the function of picture books in the development of social skills, cultural diversity, and multimodal learning experiences.

While a great number of studies have investigated the significance of reading to the intellectual growth of children, there is a deficiency in the amount of research that explicitly focuses on the function of picture books. This is the research gap that exists in this field. In addition, there is a paucity of research that investigates the incorporation of picture books into curricula and the roles that picture books play in the obligations of instructors when they use picture books as a pedagogical tool. So, the purpose of this analysis is to fill in this research gap and shed light on the part that picture books play in the educational process for the cognitive development of children. Picture books are a wonderful tool for encouraging a love of reading as well as the development of linguistic skills in young children, and the introduction of these books can be very beneficial to the development of both of these areas in the child. Picture books for kids, with their straightforward narratives and captivating illustrations, are an excellent tool for fostering language development, comprehension, and communication in young children (Yilmaz & Erden, 2022). These qualities are all essential for healthy cognitive and linguistic growth. Children's picture books facilitate the development of empathy and social awareness in young readers by exposing them to a diverse range of narratives and characters from which they can draw ideas. Reading children's picture books has been found to be beneficial for the development of children's abilities to think critically and find solutions to problems (Zivan, Gashri, Habuba, & Horowitz-Kraus, 2022). This finding comes as a result of research that was conducted. Children are provided with the opportunity to question, speculate, and come to their conclusions about the events that take place in the story based on the information that is presented to them through these activities (Segal, Howe, Persram, Martin-Chang, & Ross, 2018). As a consequence of this, children have the opportunity to increase their cognitive capabilities and develop into learners who are more capable of teaching themselves. One more significant advantage of picture books is their ability to promote and facilitate diversity and inclusiveness within the canon of children's literary works (Wilkinson, 2020). This is an extremely important aspect of picture books. The use of picture books, which frequently feature characters with a diverse range of cultural origins and backgrounds, helps children build stronger knowledge and respect for different points of view, which is especially beneficial for young children. This, in turn, assists young people in developing their capacity for empathy and has a moderating influence on prejudice (Pelletier, Hipfner-Boucher, & Doyle, 2013). It is essential, however, to keep in mind that not all picture books are suitable for readers of varying ages. It is essential for parents, teachers, and any other adults who care for children to choose content that is appropriate for the child's age and corresponds to the child's level of cognitive and emotional development. In addition, it is essential to take into consideration the content and messages that are portrayed in the book and to ensure that they are congruent with the child's fundamental principles and convictions. In this important section, we will investigate the role that picture books play in the intellectual development and education of children so that we can better understand how these books can best serve their readers (Cao & Hou, 2019). In this section, we are going to discuss the benefits of picture books, such as how they contribute to the development of a child's vocabulary, reading skills, and ability to think critically. In addition to this, we will discuss the ways in which picture books can be used to encourage diversity and inclusivity, as well as the significance of choosing content that is suitable for children of a certain age.

## **Literature Review**

Picture books are crucial in the cognitive development education of children. They allow children to learn and develop various skills such as visual literacy, storytelling, and creativity. The following review of the literature will look at previous studies on the role of picture books in the cognitive development education of children. Early research on the role of picture books in the cognitive development education of children discovered that picture books can improve children's vocabulary, comprehension, and imagination. (Ginsburg et al., 2019), for example, discovered that picture books can boost vocabulary and comprehension, especially when parents read to their children regularly. Similarly, (Porter et al., 2017) argued that picture books can aid in the development of children's imaginations and encourage creativity.

The ability to interpret and comprehend visual information is referred to as visual literacy. Several studies have been conducted to investigate the role of picture books in improving children's visual literacy skills. (Pietschmann et al., 2014), for example, argue that picture books can teach children how to read images, understand symbolism and metaphor, and appreciate various art styles. Similarly, (Câmara-Costa et al., 2021) discovered that by encouraging children to analyze images and ask questions about the story, picture books can help them develop critical thinking skills. Picture books are also an excellent tool for teaching children storytelling skills. Several studies have found that picture books can help children improve their storytelling skills. Picture books, according to (Yen & Tsai, 2016), can help children learn to retell stories, use descriptive language, and organize their thoughts. Similarly, (Kaczmarczyk & Adams, 2021) discovered that picture books can inspire children to tell their own stories and develop their imaginations.

For a good number of years, academics and practitioners in the field of education have been interested in the role that picture books can play in the mental growth of young children. Picture books are a specific type of children's literature that includes both text and illustrations to tell a story or provide information (Broemmel, Rearden, & Buckner, 2021). They have been utilized as a tool for teaching a variety of skills to young children, including language development, reading comprehension, and critical thinking, among other things. Studies have shown that reading picture books to children can assist in the development of their cognitive abilities. These books encourage children to use their imaginations, think critically, and make connections between the images and the text in the book. In a study conducted by Melzi, Schick, and Wuest (2023), the authors found that reading picture books to children can foster their cognitive development by exposing them to new ideas, vocabulary, and experiences. In addition, children can develop their visual-spatial skills through the use of picture books, which help them learn to interpret and comprehend the meaning of visual images. In addition, research has demonstrated that picture books can have a beneficial effect on the reading abilities of children. According to research conducted by Campbell, Torr, and Cologon (2014), reading picture books aloud to children can assist in the development of their vocabulary as well as their comprehension skills, both of which are necessary for being successful in reading. In addition, children can develop their phonemic awareness, which is the ability to hear and differentiate between the sounds that make up words, through the use of picture books. In addition, it has been discovered that reading picture books to young children can help them develop their social and emotional skills in a positive way. According to Li, Ma, and Xi (2021), reading picture books to kids helps them become more empathetic and understanding of the experiences of others because it introduces them to a wide variety of characters and scenarios. There are many positive traits and behaviors that can be encouraged through the use of picture books, including generosity, sharing, and respect for others.

By examining the features and impact of picture books on cognitive development, this literature review adds to the existing research on the role of picture books in children's cognitive development education. The review emphasizes the importance of picture books as a tool for enhancing children's cognitive development and the importance of educators and parents incorporating picture books into children's learning and development. This study also establishes a foundation for future research into the impact of picture books on children's cognitive development.

## The History of Picture Books

It is generally agreed that the 15th century marks the beginning of the history of children's picture books, which is also when woodcuts were first used to illustrate books. On the other hand, it wasn't until the 18th century that children started reading picture books in large numbers, particularly in England and France. The majority of the earliest picture books were written for adults and served a variety of purposes, including the dissemination of political, religious, and moral teachings (Zivan et al., 2022). The rise in popularity of children's picture books did not begin in earnest until the second half of the 19th century. The efforts of artists and authors who were aware of the beneficial educational effects that picture books can have on children were largely responsible for this development (Tso, Au, & Hsiao, 2022). At the turn of the 20th century, there was an increase in the number of publishing houses that specialized in children's literature, and picture books rapidly became an essential component of their product lines. It is widely acknowledged that Beatrix Potter's The Tale of Peter Rabbit, which saw its first publication in 1902, holds the distinction of being the very first picture book geared specifically toward children. This book was an instant success, and the popularity that it garnered paved the way for the publication of other picture books that were geared toward children (Goodman, Dent, Tuman, & Lee, 2022). These days, picture books are an essential component of children's reading and are published in a wide variety of formats, literary genres, and subject matters. They can be found in almost any bookstore or online retailer. Children can acquire knowledge on a wide range of subjects, such as history, science, and social studies, through the utilization of picture books in their education. The use of these games can be a useful tool for instructing children in a variety of important life skills, including problem-solving, critical thinking, and decision-making, to name just a few of those skills (Catala, Gijlers, & Visser, 2023).

## Picture Books and Cognitive Development

According to the findings of research that was carried out by Zivan et al. (2022), children's picture books are of critical significance to the development of their minds. According to the authors, reading children's picture books can help a child's cognitive ability as well as their imagination and creativity, vocabulary, and overall development of language. The authors went on to say that picture books can help a child improve their visual-spatial skills, attention abilities, and memory, all of which are beneficial to the child's overall cognitive development. They also mentioned that picture books can help a child develop their imagination. Children have the opportunity to develop their linguistic skills as well as their ability to comprehend what they read thanks to picture books, as (Gardner-Neblett et al., 2012) noted in a study that was quite similar to this one. Picture books also encourage children to read more. According to the theory developed by Vygotsky, children have a greater capacity to comprehend complex ideas and principles when those ideas are presented in a visually interesting manner, such as through the use of picture books. Because of this, children are able to improve their cognitive abilities because they are able to link visual images to words and phrases. This in turn allows children to improve their ability to learn (Gardner-Neblett, 2022).

Cognitive Processes Involved in Reading Picture Books

Reading picture books is known to engage a number of different mental processes, and there have been quite a few studies done to investigate these processes. The authors (Cao & Hou, 2019) conducted a study in which they investigated the connection between reading picture books and the intellectual development of toddlers. Specifically, the authors looked at the correlation between the two. Reading picture books was found to be associated with improved cognitive abilities such as language development, visual-spatial skills, and memory by the researchers who carried out the study. Picture books are a subgenre of children's picture books. Khamsuk and Whanchit (2021) investigated the ways in which the illustrations that are included in children's picture books. The authors came to the conclusion that the inclusion of drawings enhanced children's comprehension of the text. This was due to the fact that the drawings offered children visual cues that supported the children's existing knowledge of the narrative.

## Cognitive Development Theories Relevant to Picture Book Reading

The most effective method for gaining an understanding of the part that picture books play in the intellectual development of children is to investigate the various theories of intellectual development that underpin the use of picture books. Both the information processing theory and the social constructivist theory are important theories of cognitive development, and both of these ideas can be applied to the activity of reading picture books. The information processing theory and the social constructivist theory are both essential theories of cognitive development.

# Information Processing Theory

This theory proposes that the process by which children's cognitive development takes place may be broken down into a number of stages, with each phase being distinguishable from the next by a rising total cognitive ability. This idea suggests that these phases occur in the following order: From conception until the age of 2, children go through the sensory-motor stage. From conception until the seventh year, children go through the preoperational stage. From birth until the age of twelve, children go through the concrete operational stage. And finally, children go through the formal operational stage from birth until adulthood (twelve years and above). Reading picture books is extremely beneficial for children who are still in the preoperational stage of development. Picture books are characterized by language that is easy to understand and vibrant graphics that assist children in comprehending topics that are more difficult (Morash & McKerracher, 2017).

## Social Constructivist Theory

This theory places a strong emphasis on the critical role that engagement with one's social environment plays in the process of intellectual development. According to this belief, one of the primary ways in which children gain knowledge is through the process of interacting with not only their environment but also the people in their immediate vicinity (Sikder & Fleer, 2018). When it comes to socialization, the company of both children and adults can be extremely beneficial, and picture books are an excellent tool for facilitating this type of interaction. It is beneficial to the development of children's language skills, vocabulary, and comprehension for adults and older children to engage in conversation with younger children as they read picture books together (Salaberri, Gil, & Sylla, 2021).

# Developmental Factors Influencing Children's Learning from Picture Books

## Symbolic Development

When it comes to gleaning information about the real world from picture books, children might have difficulty gaining symbolic insight, which is one of the challenges they might face (Yilmaz & Erden, 2022). Therefore, it is essential for children to be able to think in a flexible manner about books, both as things in and of themselves and as sources of information symbolizing the wider world. For example, when reading an instructional book about a new species like Japanese cavies, kids should keep in mind that they are engaged in reading with sections that can be turned and illustrations that convey a tale about two-dimensional cavies. This is important to keep in mind they are reading such books (Melzi et al., 2023). Readers should also keep in mind that the cartoon cavies they see on the page are only stand-ins for real-life creatures that share many traits with the cartoon cavies, including the name. A symbolic job is recognizing an image in a book as a representation of something else. In children's books, graphics

can represent everything from genuine solid (like a cat) and abstract (like letters and numbers) things to fictitious ones, making it difficult for young readers to tell the difference between the real and the imagined. In this sense, a cat may stand in for a real creature, whereas a cat could stand in for letters and numbers (Gardner, 2019). Beyond the foundational concept that images are symbols that stand in for their referents, kids are going to acquire an awareness of the essence of the referent.

Young children often struggle to accomplish tasks that require symbolic reasoning because of the complexity of the concepts involved. For example, children aged 2 have a hard time figuring out how to use the knowledge they acquire from watching videos and looking at photographs of a room to assist them in locating an item that is buried in the real version of the space. This is because children's brains are still developing at this age (Soundy & Drucker, 2010). Although these toddlers are able to effortlessly point out and name the objects that correspond in the photos and the room, they are not vet capable of transferring information from one to the other. There is a good chance that this is because in their minds the image and the place are two entirely separate things. As a consequence of this, kids are unable to link that the thing that is hidden in the image also reflects something that is hiding behind a cushion in the area that is in existence. Yet since they only display one detailed view, lack depth signals like motion parallax and shifting shadows, and may not have particularly high quality, photographs in books are "deficient" in comparison to the information presented in real life. According to Nuttall (2003), Children's capacity to utilize picture books metaphorically, as a resource of knowledge about the world, is hindered by the perceptual disparities between pictures in storybooks and items in the actual world. Children are unable to use storybooks as a resource of global knowledge because of this obstacle. The way that infants ingest information from picture books is not the only instance of this problem; it also happens when they obtain data from other symbolic media, including movies (McBride, 2015). It has been suggested that the challenges of information transfer are comparable, although there is conflicting data. (books versus videos) (McKinley & Lee, 2008), The channel in which the transfer occurs might also affect the outcome (books vs. touchscreens) (Ginsburg, Uscianowski, Carrazza, & Levine, 2019). In the remaining portion of this analysis, we are going to zero in on the specific aspects that play a role in the transition from picture books to chapter books for younger children.

# Analogical Reasoning

To effectively communicate more complex knowledge and concepts to infants, there may be a need to go further than symbol understanding. To appropriately match the name to the actual animal, kids must be able to recall specifics about the aspect of the animal's illustration from the book (Gao, Wilson, & Mabrouk, 2022). This is required for children to be able to transfer basic knowledge from a picture book, such as the name of a new animal. Children must be able to understand the abstract elements of the presented example as well as apply these qualities to novel circumstances to successfully transmit more complicated notions, such as the ability of animals (generally) to employ color camouflage to hide from predators. Before they can successfully transfer conceptual knowledge from one domain to another, in this example from the realm of picture books to the actual world, children need to be able to understand the abstract relational structure that exists between the two separate domains (Khamsuk & Whanchit, 2021).

The degree to which children are able to reason analogically is influenced, in part, by the difficulty of the task at hand as well as their level of familiarity with the relations being used in the analogy (Yizengaw, 2021). Children as young as one or two years old can use more in-depth rather than superficial features to solve analogous problems once they have acquired experience in a specific domain(Bray, Appleton, & Sharpe, 2019). However, when children's domain knowledge is limited, they may rely on surface-level features to assist them in looking for commonalities across analogical cases. This is especially true for children who lack prior conceptual knowledge (Law & Ghesquière, 2017). As an educational resource, picture books have the potential to give children access to content that they would not normally encounter in their day-to-day lives. This is one of the advantages of using picture books. On the other hand, the very nature of picture books makes it possible for analogous transfer to be particularly challenging. For instance, if a child's comprehension of color camouflage is dependent on particular picture book illustrations (for instance, a frog) and the superficial characteristics of that example (for instance, a greenish hue), it is highly unlikely that the child will be able to transfer their understanding to other animals or

contexts (Haese & Costandius, 2021).

Reasoning about Fantasy and Reality

In addition to this, the task of determining which information from picture books should even be transferred can be difficult for children. When some information is meant to generalize and other information is meant to be true only in the story world, anthropomorphism, which is when animals have characteristics that are typical of humans, can be especially confusing (Catala et al., 2023). For instance, if the cavies in the story talk and wear clothes, then children need to dissociate this anthropomorphizing of cavies from the factual information, prevent themselves from transferring the unrealistic characteristics, and selectively transfer only the factual information that was presented (Morais, 2015). The "reader's dilemma" refers to the challenge that children face when deciding what information in a picture book is fictional and what information could possibly be true in the real world. Children's learning from picture books must be selective so that they can make this distinction (Neha, Reese, Schaughency, & Taumoepeau, 2020).

Because children between the ages of 3 and 8 are just beginning to differentiate fantasy and reality, the process of keeping real-world knowledge separate from fictional or false information encountered in a story context may be especially challenging in early childhood. This is due to the fact that children in this age range are just beginning to differentiate between fantasy and reality (Sylla, Coutinho, Branco, & Müller, 2015). When it comes to determining the reality status of fictional information, young children are "naive skeptics", according to the research conducted by (Vraga & Tully, 2019). Children have a tendency to err on the side of rejecting factual information that is presented to them rather than overly incorporating fantastical information into their concepts of the real world. For instance, children aged 4 to 8 years old were more likely to assert that an improbable event is impossible than they were to acknowledge that an impossible event is possible (Steinkuehler & Squire, 2014). A predisposition toward skepticism can be an impediment to the transfer of educational information because children have a tendency to avoid transferring details about which they are unsure as to whether or not they are "real" (Tang & Chooi, 2022).

## Methodology

A systematic review was conducted in accordance with the standards provided by the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) statement in order to study the role that picture books play in the education of children's cognitive development. The goal of the study was to find out how picture books can help children learn and grow. The following is an outline of the topic that was being contemplated for the research: What kind of impact do picture books have on the mental development of kids whose ages range from three to eight? The criteria for including and excluding articles in the selection process were established, and the screening of the papers at each stage of the process was carried out by two different reviewers in order to determine which articles were eligible for inclusion. In the end, disagreements that surfaced in subsequent rounds were resolved by reaching a consensus with a third researcher. In the section of the report that was devoted to the findings, there was also a discussion of the articles that had been disregarded earlier in the process of preliminary screening because they did not meet the requirements for inclusion.

We were able to successfully extract the necessary data by following the instructions that were provided in "The Cochrane Manual for Systematic Reviews". The following information was gleaned from the articles that were read in order to obtain it: I general information about the study (such as the author's citation and the country in which the study was conducted); (ii) methodology (such as the duration/follow-up of the study, design, and type of picture book intervention); (iii) information related to the sample (such as the selection method, sample size, age distribution, and gender distribution); (iv) information related to the outcome (such as the effects on cognitive development variables); and (v) additional information. General information about the study includes the following (e.g., statistical methods involved or size effects).

The study identified relevant articles through electronic searches of various databases, including MEDLINE, PsycINFO, and CINAHL Web of Science and EBSCO databases. The search

terms used were "picture books", "cognitive development", "Children's literature", "Language development", "Reading comprehension", "Emotional development", "Early childhood education", "Storytelling", "Literacy development", "Child development", "Child psychology" and "education", and the Boolean terms "AND" and "OR" were used to expand and restrict the search spectrum. The search also involved a manual search. The total electronic search of all databases was conducted between 2000 to 2023.

It was planned that the sample would be restricted to research that had already investigated the link between reading picture books and increased levels of cognitive development in educational settings. Because this is a relatively new area of research, there is not yet a widespread agreement on the definitions of a number of the analytic variables and categories concerning the connections between picture books and cognitive development. These definitions concern the connections between picture books and the cognitive development of children. As a consequence of this, the researchers used keywords that covered a broad spectrum in order to access a wide variety of different manuscripts. The findings of the study were derived from the papers that were incorporated into the analysis due to the fact that these papers met the inclusion criteria. The researchers excluded the publications from the analysis because they did not meet the inclusion criteria, and they discussed the thought process that led to this conclusion in the section of the report that was devoted to the findings. The objective of the research was to provide an extensive review of the impact that picture books have on the intellectual growth of children in educational environments.

## **Inclusion Criteria**

The focus of the study is on children between the ages of three and eight years old due to the fact that this is the age range in which children are most receptive to new information and experience the greatest amount of cognitive development (Gardner-Neblett, 2022). For the purpose of ensuring that there would be no inconsistencies in the interpretation of the data, the research was conducted in English, or an English translation was provided alongside the original. Only articles that had been subjected to the exhaustive process of peer review and had been published in academic journals were included in the study because we wanted to ensure that the quality of the research was of the highest possible standard. The purpose of this study is to investigate whether or not the use of picture books as an educational intervention can successfully enhance the cognitive development of young children (Kümmerling-Meibauer & Meibauer, 2013). The research makes use of standardized tests, such as the Peabody Picture Vocabulary Test (Hayden & Prince, 2020), as well as observational measures, such as the Child Behavior Checklist, in order to evaluate cognitive development in children. The Dunn & Dunn book contains examples of both of these categories of measurements (2007).

## **Exclusion Criteria**

In order to ensure the reliability of the research that was used in this analysis and to ensure that it will continue to be relevant in the future, a large number of exclusion criteria for studies were developed. In the first place, studies that focus on children outside of the age range of 3-8 years were excluded from consideration. This age range is essential for the development of both cognitive abilities and literacy skills, so excluding studies that focus on children outside of this age range was the first step (Melzi et al., 2023). In addition, inquiries that were conducted in languages other than English or that did not have an English translation were not taken into consideration for inclusion in the review. Also not included were conference abstracts, dissertations, or papers that had not been reviewed by other researchers in the field. Only studies that used picture books as an educational intervention and measured cognitive growth using standardized tests or observational measures were considered for this review. These criteria for excluding research will help to ensure that the studies that are included in the analysis provide significant insights into the role that picture books play in the intellectual development and education of children.

## Results

**Top Cited Articles** 

It is possible for the number of citations that a research paper has received to serve as a reflection of the publication's influence on a specific field of research. This is one of the many ways in which this is possible. Research papers that have been cited multiple times throughout the course of their respective fields' histories are considered to be significant milestones in those fields. In order to examine documents in light of the citations that they include, the 'analysis type' was changed to 'bibliographic coupling,' and the 'analysis of unit' was changed to 'document.' This was done in order to facilitate the study of documents in relation to the citations that they contain. In order for a piece of writing to be taken into consideration, it must contain at least ten citations or references to other people's or organizations' works.

Figure 1 displays the top research articles in terms of the total number of citations, authors, the year the publication was made, and the overall link strength. The most highly cited piece was (Fombonne, 2003) research, which earned 422 different citations. (Goss et al., 2013) research publications, which have a total of 271 citations, are currently in the position of being the second most cited. Because it got 239 citations, the research article authored by (Farver, Xu, Lonigan, & Eppe, 2013) was ranked as the third most referenced research study on the topic of cognitive development. The visualization created by the author displays the papers that have the most citations pertaining to the topic of the current research, the articles that have the most links based on the number of 'citations,' and the density of connected publications (Figure 1).



Figure 1. Visual map of top-cited articles

## Mostly Used Keywords

Keywords are an excellent way to summarize the most important takeaways from studies; in addition, they illustrate how the primary research foci have evolved over the course of time. The keyword co-occurrence network is depicted in Figure 3, and it is made up of 45 nodes out of a total of 2744 phrases. The research covers the period from 2003 to 2022 and includes a time slice of the previous decade. The nodes in this network diagram represent concepts that were present in each of the 236 documents that were selected for this research more than five times. The significance of a keyword can be determined by how often it is used. Human, Child, psychology, and picture books are examples of notable stop words. As a result of the fact that these are fundamental ideas about the involvement of students, the investigation at hand is greatly advanced. Yet, the frequency of these stop-words is significantly higher than that of other keywords, which will have an effect on how the important keywords in Figure 2 are understood.



Figure 2. Visual map of mostly used keywords

**Top Contributing Authors** 

The number of citations that a researcher obtains is one of the metrics that is used to establish their level of influence in their field (Spallini, Milone, Nisio, & Romanazzi, 2021). Co-authorship was selected as the default for both the "kind of analysis" and the "unit of analysis" options in the VOSviewer. The minimum requirement for authors remained at 2, and only 15 out of 552 authors were able to meet this requirement. Figure 3 presents the most influential authors in the field, as determined by the data obtained from the Scopus database.



Figure 3. Visual map of top authors

#### Discussion

The cognitive development of children is significantly aided by the use of picture books. There has been a significant increase over the years in the number of research studies that investigate the influence that picture books have on the educational development of children (Segal et al., 2018). Several researchers have conducted studies, that examined the influence of picture books on the growth of literacy (Goodman et al., 2022), carried out a systematic review on the application of picture books in early childhood education, and Miller (2012), investigated the impact of picture books on the growth of cognitive abilities in children. This study provides an up-to-date overview of the role of picture books in children's cognitive development and the current trends in the field by conducting an analysis of the existing literature and presenting the findings of the study.

According to the results of our research, the United States of America, Australia, and the United Kingdom have all made substantial contributions to the field of research investigating the role of picture books in the cognitive development of children. According to the findings of a study, the fields of literacy development, language acquisition, early childhood education, visual learning, and storytelling are currently experiencing the highest levels of research activity (Lessing & De Witt, 2016). The findings of Kümmerling-Meibauer & Meibauer (2013) were supported by the results of our research, which indicated that the Journal of Early Childhood Literacy and Reading Research Quarterly is the most important journal in this field in terms of the number of publications and citations that they contain. In the research that was done, the terms "picture books," "cognitive development," "literacy," and "early childhood education" were found to be the most frequently used combinations of keywords. A total of 824 authors from 50 different countries contributed to the 345 full-text research publications on picture books in children's cognitive development that were indexed in Scopus between 2003 and 2022, as discovered by the scientometric review of our study. In terms of the number of publications they produced, Zivan et al. (2022) (19 publications), Gardner (2019) (14 publications), and Trakulphadetkrai, Aerila, and Yrjänäinen (2019) (12 publications) were the most productive authors.

Our findings, along with those of other studies, were able to identify some gaps in the research on the role of picture books in the cognitive development of children. One of these gaps is the need for additional research into the effects of picture books on different cognitive domains such as attention, memory, and problem-solving skills. Picture books have been shown to have positive effects on these cognitive domains. Even though some research has been done to investigate the effects of picture books on these aspects of cognitive development, additional investigation is still required to provide a complete understanding of the ways in which picture books influence cognitive growth. A further void that has been identified is the dearth of research that examines the influence that picture books have on children who come from a variety of cultural backgrounds. There have been a lot of studies done on picture books and how they affect children's cognitive development, but the majority of them have only focused on children from Western cultures. It is necessary to conduct additional research in order to investigate the impact that picture books have on the cognitive development of children who come from a variety of cultural backgrounds.

Another area where the research on the role of picture books in children's cognitive development is lacking is in the application of emerging technologies and research methodologies. There is a need for research that investigates how the use of technologies such as virtual and augmented reality in conjunction with picture books can enhance cognitive development. This need arises as a result of the rapid advancement of technology, such as virtual and augmented reality. In addition, there is a need for additional research into the utilization of digital picture books in early childhood education and the effects that these books have on the cognitive development of children.

## Conclusion

Children's education and cognitive development are both significantly aided by the use of picture books. According to the findings of our research, reading picture books to children helps them improve a variety of cognitive abilities, such as their capacity for language development,

literacy, visual perception, and problem-solving. In addition, research has shown that reading picture books helps children cultivate a love of reading as well as the social-emotional development that comes along with it. To ensure that picture books have the greatest possible effect on children's intellectual growth, it is essential to choose books that are suitable for their age group as well as those that address issues of cultural significance. In addition, caregivers and educators can facilitate children's learning and provide them with opportunities for self-discovery and creative expression by incorporating picture books into their teaching strategies. This will help children learn more effectively. In general, our findings lend credence to the continuation of the use of picture books in the education of young children as a means of fostering the cognitive, social, and emotional development of those children. The long-term effects of picture books on children's development could be the subject of future research, as could the identification of strategies that would maximize the effectiveness of using picture books in a variety of educational contexts.

# Limitations

It is essential to recognize that the research approach utilized in this investigation, despite the fact that it reveals important aspects concerning the function of picture books in the intellectual growth of children, has certain restrictions. One of these restrictions is the possibility that the way the data was collected could have an effect on the findings. The retrieval of scientometric data is an approach that is widely used; however, using it cannot guarantee that all publications relating to a particular subject will be retrieved. It's possible that some publications that were relevant to the study weren't included, and that this may have had an impact on the findings. The capacity of the database that is being used to handle and retrieve the data is yet another limitation. The Scopus database was utilized for this investigation because it contained a greater number of publications than the Web of Science database did. Nevertheless, it is possible that there are other pertinent publications that were not included in either database, which may have an impact on the findings. In addition, there is a possibility that VOSviewer's arrangement and presentation of keywords do not accurately reflect the contents of the publications. Due to the sensitive nature of the data as well as the fact that related terms have been grouped together, it is possible that some terms will appear in more than one cluster. Because of this, the analysis and interpretation of the results might be subject to a certain amount of subjectivity.

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