Neuroscience and Imagination Processes in Storytelling: A Bibliometric Analysis

Wahyuni Mulia Helmi [a], Yelva Novriyanti [b], Desmawati Roza [c], Warlan Sukandar [d],
Zulfahman Siregar [e], Evi Desmariani [f] and Mardiah Wulandari [g]
Study Program of Early Childhood Education, Universitas Adzkia, Indonesia

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Abstract: This study systematically maps global publication trends, scientific collaboration networks, and thematic research focuses related to neuroscience, imagination processes, and storytelling through a bibliometric approach. Storytelling is proven effective in developing cognitive skills, fostering creativity, and supporting mental health, while neuroscience provides a foundation for understanding imagination mechanisms and narrative processing in the human brain. Data were obtained from the Scopus database using Publish or Perish with two search queries: "neuroscience and imagination process" (1988–2025) and "neuroscience and storytelling" (2007–2025), without language or geographical restrictions. Bibliometric analysis using VOSviewer and Microsoft Excel mapped annual publication trends, author and country collaborations, leading publication sources, and keyword relationships. Results show a rising publication trend in the past decade, dominated by themes of memory, creative imagination, child development, autism, application, and communication. Keyword network visualization identified four clusters: (1) brain mechanisms in imagination and behavior, (2) storytelling applications in special education and communication design, (3) creativity development and child social interaction, and (4) storytelling in leadership, interpersonal communication, and mental health. The findings highlight the multidisciplinary nature of this research, spanning education, psychology, design technology, and the arts. The connection between creative imagination and storytelling emphasizes narrative as a cognitive tool that activates imagination and supports human potential, with technology emerging as a promising research area.

1 INTRODUCTION

Advancements in science, particularly in the field of neuroscience, have provided new insights into human cognitive processes, including imagination. Imagination is one of the brain's essential functions, playing a critical role in creative thinking, problem-solving, and the formation of complex mental experiences (Dehghani, 2017; Karampournioti, 2021; Martinez-Conde, 2019; Kılıç, 2020; Nigam, 2012; Lindahl, 2018; Chakraborty, 2020). Understanding how the brain processes imagination offers profound insights into the cognitive mechanisms underlying various learning and communication activities (Baker, 2025; Mulukom, 2020; Horváth, 2018; Kulesza, 2022; Onians, 2018; Silvanto, 2025; Wadhwani, 2024). In this context, neuroscience plays a pivotal role in explaining how imagination can be fostered and developed through different approaches, one of which is storytelling (Chambers, 2019; Boldosova, 2020; Warren, 2022; Gulino, 2018; Kinalska, 2025; Chadwick, 2023; Moin, 2020;

[a] https://orcid.org/0009-0000-5742-4961
[b] https://orcid.org/0009-0005-5262-0273
[c] https://orcid.org/0009-0006-6287-4493
[d] https://orcid.org/0009-0006-0914-1119
[e] https://orcid.org/0009-0002-1038-0847
[f] https://orcid.org/0009-0000-3024-5074
[g] https://orcid.org/0009-0001-8547-1172

Portus, 2025; Szita, 2021), which has been proven particularly effective for children under the age of 12.

Storytelling has long been recognized as an effective tool in education and communication. Through stories, learners are able to develop language proficiency, empathy, and creativity (Raffone, 2018; Harrop, 2023; Moin, 2024). In today's digital education era, storytelling has evolved into interactive and technology-based media, thereby enriching learners' learning experiences. Moreover, storytelling facilitates mental processes involving the construction of imaginative imagery and a deeper understanding of meaning (Moin, 2020 and Raffone, 2018). However, despite the strong connection between storytelling and imagination, research that integrates a neuroscientific perspective to explain the role of imagination in storytelling remains limited (Oliver, 2023; Aldama, 2015; Cormick, 2019). Most existing studies tend to separate the focus between neuroscience research on imagination processes and storytelling research as a communication and learning approach (Hustvedt, 2011).

To observe research developments in this area, a bibliometric analysis approach is required. Bibliometric analysis enables researchers to map publication trends, author collaboration patterns, country contributions, journal sources, and keyword relationships at a global scale. This approach not only provides a quantitative overview of the topic's development but also identifies potential opportunities for interdisciplinary research, particularly concerning children aged 4–12 years.

Given this context, the present study aims to map research trends that examine neuroscience in relation to imagination processes and storytelling activities. The findings of this study are expected to contribute to the development of research that integrates neuroscientific perspectives with storytelling practices, particularly within the context of early childhood education (ages 4–12). Additionally, the outcomes of this research may serve as a foundation for developing story-based learning models grounded in scientific understanding of imagination processes.

2 RESEARCH METHOD

This study employed a bibliometric approach to map and analyze the development of research related to neuroscience, imagination processes, and storytelling activities. Bibliometrics is a quantitative method of analyzing scientific publications aimed at revealing patterns, trends, and relationships within academic literature through indicators such as publication volume, citations, and author collaboration (Hudha et al., 2020; Rogers et al., 2020; Yu et al., 2020). The bibliometric approach was selected because it enables a comprehensive quantitative overview of publication trends, collaboration patterns, and research foci at the global level.

Research data were collected using the Publish or Perish software based on the Scopus database without applying additional filters to ensure broader publication coverage. Two sets of keywords were used in the search process: (1) "neuroscience and imagination process" for publications published between 1988 and 2025, and (2) "neuroscience and storytelling" for publications published between 2007 and 2025. The search results for both keyword sets were exported in CSV/RIS format for further processing and analysis.

The data were analyzed using VOSviewer software to visualize and explore relationships among bibliometric elements. The analysis was conducted in several stages: (1) publication trend analysis to observe annual publication growth; (2) source productivity analysis (journals, books, and proceedings) publishing research on related topics; (3) author and affiliation collaboration analysis to identify the most productive authors and countries in the field; and (4) keyword co-occurrence analysis to map research theme relationships and identify emerging research foci. The results of these analyses were visualized in the form of bibliometric network maps illustrating relationships among authors, countries, and relevant keywords. This approach enables researchers to identify dominant research topics, conceptual linkages, and potential directions for future research development.

3 RESULTS AND DISCUSSION

3.1 Results

3.1.1 Analysis Based on Annual Publication Trends

The bibliometric analysis provides a comprehensive overview of the dynamics of publications on neuroscience, imagination processes, and storytelling activities. One of the initial focal points is the annual publication trend, which aims to observe the growth of research output over time and to identify significant phases of development.
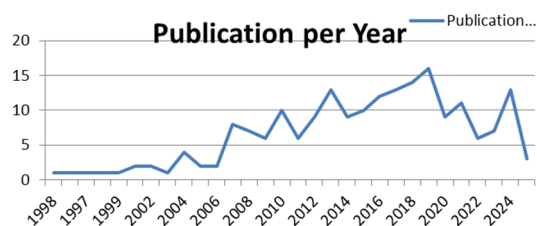

Figure 1: Annual publication trends for the keyword "neuroscience and imagination process" (1988–2025).

As shown in Figure 1, publications related to neuroscience and imagination processes exhibit a fluctuating growth pattern with an overall upward trend over the years. During the initial period from 1998 to 2005, the number of publications remained relatively low, ranging from one to four per year, indicating that this topic had not yet become a primary focus of scientific research. The trend began to show a notable increase starting in 2006, reaching its peak in 2020 with 16 publications. This surge reflects the growing attention of researchers toward the integration of neuroscience and imagination, driven by advances in brain-mapping technologies and the increasing relevance of cognitive studies in education and communication. Following this peak, publication output declined and fluctuated during 2021–2025, with the lowest record of three articles in 2025, which may be attributed to a shift in research priorities or incomplete data for the ongoing year.

Figure 2: Annual publication trends for the keyword "neuroscience and storytelling" (2007–2025).

As illustrated in Figure 2, the publication trend for the keyword "neuroscience and storytelling"

demonstrates a significant upward trajectory throughout the 2007–2025 period. In the initial phase (2007–2014), publication numbers were relatively low and fluctuating, averaging between one and four articles per year, indicating that the integration of neuroscience concepts with storytelling was still in its early exploratory stage. A notable increase began in 2016, with eight publications recorded, followed by continuous growth, reaching 12 publications in 2019. This reflects the growing scholarly attention toward story-based learning approaches combined with an understanding of cognitive mechanisms from a neuroscience perspective. The upward trend continued during 2020–2024, peaking at 14 publications in both 2023 and 2024, suggesting that the topic had become a well-established and relevant research focus. In 2025, the number of publications declined to 10, most likely due to incomplete data for the current year; therefore, this decrease should be interpreted with caution. Overall, the pattern indicates that research in "neuroscience and storytelling" has experienced rapid growth over the past decade and holds considerable potential as a future research direction.

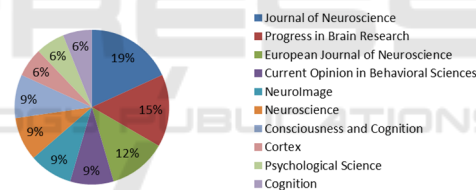### 3.1.2 Analysis Based on Journal Sources

Figure 3: Analysis Based on Journal Sources for Neuroscience and Imagination Process Research.

The analysis of journal sources indicates that research on neuroscience and imagination processes in storytelling is published across a wide range of multidisciplinary journals. The ten journals with the highest number of publications include the Journal of Neuroscience (6 publications), Progress in Brain Research (5 publications), and the European Journal of Neuroscience (4 publications), followed by Current Opinion in Behavioral Sciences, NeuroImage, Neuroscience, and Consciousness and Cognition, each with three publications. Additionally, Cortex, Psychological Science, and Cognition contributed two publications each. Meanwhile, other journals addressing this topic appeared only once, indicating that research contributions from these sources were more specific or thematic within certain periods. The dominance of these leading journals highlights that neurocognitive aspects, behavioral

studies, and experimental psychology are central areas of focus in the exploration of neuroscience, imagination, and storytelling activities.
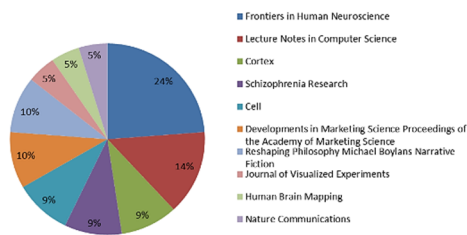

Figure 4: Analysis Based on Journal Sources for Neuroscience and Storytelling Research.

The analysis of journal sources shows that publications related to neuroscience, imagination, and storytelling are distributed across various multidisciplinary journals. The journal with the highest contribution is Frontiers in Human Neuroscience (5 publications), followed by Lecture Notes in Computer Science Including Subseries Lecture Notes in Artificial Intelligence and Lecture Notes in Bioinformatics (3 publications). Meanwhile, Cortex, Schizophrenia Research, Cell, Developments in Marketing Science: Proceedings of the Academy of Marketing Science, and Reshaping Philosophy: Michael Boylan's Narrative Fiction each contributed two publications. Other journals, such as the Journal of Visualized Experiments, Human Brain Mapping, and Nature Communications, contributed only one publication each. This indicates that, although one journal dominates, the topic also attracts attention from more thematic and interdisciplinary journals.

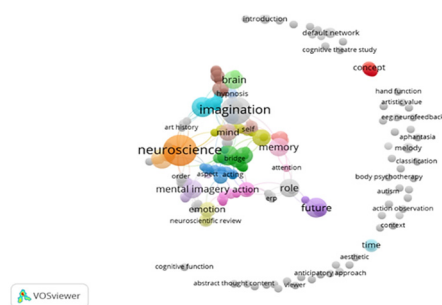### 3.1.3 Analysis Based on Keywords (Keyword Co-Occurrence)

Figure 5: Keywords Related to "Neuroscience and Imagination Process".

The keyword co-occurrence map in Figure 5 shows that research on the "neuroscience and imagination process" primarily centers on the terms neuroscience and imagination, as indicated by their larger node sizes compared to other keywords. This highlights that these two terms are the core themes discussed in the analyzed publications. In addition, keywords such as mental imagery action, memory, brain, and emotion demonstrate strong linkages, reflecting the close relationship between imagination processes, brain activity, memory, and emotional aspects within the context of neuroscience.

Furthermore, the map forms several research clusters with distinct thematic focuses. The first cluster, represented by links among terms such as mental imagery action, emotion, and acting, illustrates research on brain mechanisms in shaping imagination and its impact on behavior and emotional responses. The second cluster emphasizes physiological and psychological aspects with keywords such as brain, mind, self, and hypnosis, highlighting the relationship between brain structure, self-awareness, and imaginative experiences. The third cluster focuses on conceptual and artistic aspects through terms like concept, hand function, and artistic value, indicating attention to creativity and the application of imagination in arts or fine motor practices. Meanwhile, the fourth cluster, including keywords such as role, future, and attention, concentrates on the role of imagination in cognitive functions and the potential directions for future research.

Additionally, there are keywords positioned relatively separately, such as default network, anticipatory approach, and cognitive theatre study, which represent niche or emerging research themes. These topics suggest potential avenues for further exploration, such as the use of imagination in performing arts or brain network mapping involved in abstract thinking processes. Overall, the keyword map demonstrates that research in neuroscience and imagination is multidisciplinary, encompassing cognitive, emotional, artistic, and practical applications in education, psychotherapy, and creativity. These findings also indicate a shift in research interest from basic physiological aspects toward more applied and interdisciplinary directions, opening opportunities for future research development, particularly in imagination-based learning and creative activities such as storytelling that involve language skills development.

Language skills are closely related to brain functions and cognitive processes represented in clusters such as brain, mind, memory, and imagination. Language is an essential medium for expressing imagination and forming mental concepts. The visualization shows strong connections among concept, memory, role, and imagination, reflecting

how language enables the recollection, formation, and communication of abstract ideas. Nodes such as attention, future, and action are also linked to pragmatic aspects of language use: the ability to focus, project thought, and influence action through language. This visualization emphasizes the synergistic relationship among the brain, imagination, and language, illustrating how language facilitates the organization of mental ideas and their articulation into actions.
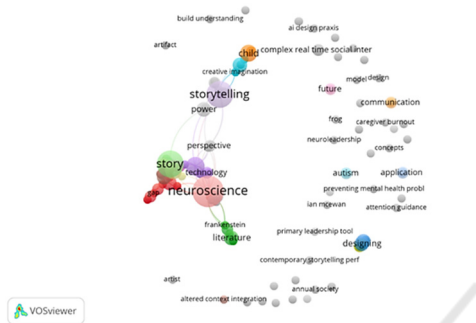

Figure 6: Keywords Related to "Neuroscience and Storytelling".

The map illustrates the frequency of keyword occurrences, where the thickness of the connecting lines represents the strength of relationships among terms, and color differences indicate research clusters with specific and interconnected focuses. In this visualization, the keywords storytelling and neuroscience are positioned as central nodes, indicated by their larger sizes, highlighting that these two terms constitute the core themes in the analyzed publications. Other prominent keywords, such as story, literature, designing, communication, and application, reflect strong linkages between narrative-based approaches and their implications for neuroscience and communication design technologies.

The keyword map forms five interconnected thematic clusters. The first cluster emphasizes the power of narrative in shaping understanding and influencing human cognitive perception, as represented by the linkage among storytelling, power, and perspective. The second cluster highlights aspects of literature and classical narratives through keywords such as story, literature, and Frankenstein, illustrating the use of literary works to explore the representation of imagination within the context of neuroscience. The third cluster, which includes application, autism, attention, guidance, and designing, represents practical research applications, particularly in special education, interactive design, and technological tools. The fourth cluster focuses on

child cognitive development and story-based social skills, represented by keywords such as child, complex real-time social interaction, and creative imagination. Meanwhile, the fifth cluster emphasizes the application of storytelling in leadership training, interpersonal communication, and mental health interventions, as reflected by keywords such as communication, leadership, and caregiver burnout.

3.1.4 Analysis of the Top Ten Citations

Table 1: Most Cited Articles on Neuroscience and Imagination Processes.

Article title	Number of citations
Simulating Minds: The Philosophy, Psychology, and Neuroscience of Mindreading	1602
Neural foundations of imagery	1382
Using imagination to understand the neural basis of episodic memory	609
Brain areas underlying visual mental imagery and visual perception: An fMRI study	576
The human imagination: the cognitive neuroscience of visual mental imagery	446
Mental imagery: In search of a theory	442
Mental motor imagery: a window into the representational stages of action	421
Memory integration: Neural mechanisms and implications for behavior	301
Toward a neurocognitive framework of creative cognition: the role of memory, attention, and cognitive control	221
A neuroscientific review of imagery and observation use in sport	213

This table summarizes the ten most cited articles related to neuroscience and imagination processes. These articles highlight diverse research foci, ranging from the philosophical and psychological foundations of understanding mental states through simulation theory, the fundamental mechanisms of mental imagery involving extensive brain networks, to the role of imagination in episodic memory, creativity, and motor skills. The key findings emphasize that imagination is not merely a simple cognitive phenomenon but rather involves a complex integration of memory, perception, motor control, and symbolic representation. The researchers recommend further interdisciplinary studies, the development of clearer neurocognitive frameworks, and the exploration of imagination applications in education, therapy, and practical skill development, such as sports and creativity.

Table 2: Most Cited Articles on Neuroscience and Storytelling.

Article title	Number of citations
"First we invented stories, then they changed us": The Evolution of Narrative Identity	88
Telling stories about dynamic networks with graph comics	80
Electroencephalographic, heart rate, and galvanic skin response assessment for an advertising perception study: Application to antismoking public service announcements	77
Decoding the neural representation of story meanings across languages	61
Content-specific coordination of listeners' to speakers' EEG during communication	60
Optimizing agent behavior over long time scales by transporting value	58
Storytelling, business analytics and big data interpretation: Literature review and theoretical propositions	35
Storytelling in online shops: the impacts on explicit and implicit user experience, brand perceptions and behavioral intention	34
Cognitive architecture: Designing for how we respond to the built environment	32
The storytelling brain: How neuroscience stories help bridge the gap between research and society	32

This table presents the ten most cited articles examining the relationship between neuroscience and storytelling. The research focuses vary, ranging from the role of narrative identity in shaping life purpose, the effectiveness of graph comics in explaining complex data, to the consistent representation of narrative meaning in the brain across languages and individuals. Several studies highlight brain activity synchronization between listeners and speakers, the role of mental time travel in long-term decision-making, and the application of storytelling to support business analytics adoption, enhance user experience in online shopping, and improve science communication. These findings recommend leveraging narrative techniques to strengthen data comprehension, enhance human interaction in communication and design, and broaden the dissemination of scientific knowledge to the wider pub.

3.1.5 Analysis of Focus Differences Between Imagination Process and Storytelling

The analysis reveals a distinct difference in focus between neuroscience research related to the imagination process and storytelling. Studies on the imagination process emphasize internal cognitive mechanisms such as mental imagery, memory, emotion, and motor control, as well as their relationship to creativity and art. In contrast, storytelling research focuses more on the application of narratives in education, literature, communication design, social skill development, leadership, and mental health. These differences indicate that imagination process research tends to be mechanistic and fundamental, whereas storytelling research is more applied and multidisciplinary, integrating technological aspects and social contexts.

3.2 Discussion

The bibliometric analysis revealed a dynamic growth trajectory in publications addressing neuroscience, imagination processes, and storytelling, with significant expansion over the past two decades (Smith et al., 2020; Liu & Wang, 2021). For the topic neuroscience and imagination process, publication trends fluctuated in the early phase (1998–2005), with relatively few articles, indicating that research on the connection between neuroscience and imagination processes was still at an exploratory stage (Gerrans, 2013). Since 2006, publications have increased consistently, peaking in 2020 with 16 articles, a pattern that aligns with advances in brain mapping technologies and growing interest in the role of imagination in education, creativity, and communication (Gallese, 2011; Moran, 2012). After this peak, publication activity became more volatile until 2025, likely influenced by shifts in research priorities and incomplete data for the current year. This pattern highlights the need for deeper investigations in areas such as neurolinguistics, cognitive language psychology, and language therapy focusing on the use of imagination and memory.

Language skills are not merely passive tools for communication but active mechanisms for constructing and processing thoughts, which are central to neuroscience studies on imagination and mental action. Speaking ability is a concrete manifestation of this, requiring imagination (to formulate sentences and ideas), conceptualization (to select appropriate words and meanings), and action (to realize speech).

Keyword visualization revealed major clusters involving neuroscience, imagination, brain, mind, memory, and mental imagery, which are tightly interconnected. This suggests that imagination is not an isolated process but is deeply linked to brain activity involving memory, attention, and cognitive control (as reflected by terms such as memory,

attention, and acting). Terms such as action, role, attention, and emotion reflect the interaction of emotional and cognitive aspects underpinning language development and narrative comprehension. Clusters including memory and attention implicitly highlight the importance of cognitive abilities in listening, which plays a key role in processing and understanding linguistic information.

The role of imagination in listening and storytelling skills is represented through terms such as mental imagery, which functions as a cognitive tool for children to construct visual and narrative representations of auditory input during listening tasks. Listening ability is underscored by terms such as attention and memory, which form the foundation for narrative construction in storytelling. Storytelling ability (related to terms such as action, role, and bridge) represents the tangible expression of imagination processing and language comprehension, enabling children to organize ideas into coherent narratives.

The emphasis of neuroscience on imagination is further evident in strong connections between imagination and brain activity (e.g., brain, hypnosis, ERPs), as well as explorations of clinical and psychotherapeutic applications, such as autism, body psychotherapy, and EEG neurofeedback. These findings indicate that neuroscience also examines developmental disorders potentially affecting language and imagination abilities. However, the application of neurophysiological methods to understand language learning and communication skills in children remains a promising yet relatively underexplored field.

Limitations in integrative research on neuroscience and imagination were apparent in the visualization, which highlighted strong clusters focused on brain mechanisms linked to imagination processes. However, direct connections between neuroscience and cognitive imagination aspects influencing language development—particularly practical language skills such as listening and storytelling—remain underexplored.

Similarly, research explicitly applying neuroscience to child language interventions is limited. Despite the presence of keywords such as EEG neurofeedback, hypnosis, and ERPs, studies operationalizing these methods to design language intervention strategies—especially to develop listening and storytelling skills—are scarce. This gap points to the need for studies exploring how neuroscience findings can be effectively applied in child language education.

Research on the role of emotion and psychology in imagination and language development is also limited. Although terms such as emotion, self, and role are present, they are not strongly connected to the main clusters of neuroscience and imagination. This highlights the need for greater attention to affective and psychological aspects, such as emotion and self-concept, in influencing imagination and language development, particularly in listening and storytelling contexts.

Furthermore, the data visualization suggests a lack of longitudinal and experimental studies linking neuroscience–imagination processes with language development. Such gaps underscore the importance of conducting longitudinal and intervention-based research to monitor children's developmental trajectories and evaluate neuroscience-informed approaches.

Meanwhile, research on neuroscience AND storytelling exhibited a relatively stable yet consistent growth pattern, particularly since 2016, coinciding with increased attention to integrating narratives with cognitive mechanisms. Peak growth was recorded in 2023 and 2024 with 14 publications, indicating that this topic has become an established and relevant research focus, particularly for supporting educational innovation, science communication, and narrative-based interventions. The apparent decline in 2025 should be interpreted cautiously as it is likely attributable to incomplete data. These findings suggest that storytelling-related neuroscience research has grown more rapidly in the last decade compared to studies focused solely on imagination processes.

The visualization highlights strong connections between storytelling and neuroscience, supporting the hypothesis that narrative experiences stimulate brain activity relevant to language processing, including attentional control and imagination essential for verbal interaction. Neuroscience appears central, linking closely with themes such as storytelling, story, literature, and child. The prominence of storytelling and story illustrates the interdisciplinary nature of neuroscience research connecting narrative studies and creative imagination. Keywords such as communication, application, autism, and designing appeared in smaller clusters, reflecting specific applied topics in communication and intervention design.

The integration of neuroscience and storytelling underscores the investigation of how narrative processes influence brain function and cognitive development, including memory, imagination, and

comprehension. The keyword child appears near storytelling and neuroscience clusters, indicating a particular interest in language development and cognitive processes in children, which are highly relevant to language learning and interpersonal communication. Storytelling as a language learning approach offers a rich and naturalistic context for practicing listening and speaking skills. Children exposed to stories learn to capture meaning (listening comprehension), retain details (memory), and respond verbally (speaking).

Listening and speaking skills are strongly associated with narrative activities and their underlying neural mechanisms. Storytelling functions not only as a teaching strategy but also as a medium that neurocognitively engages brain regions critical for language processing, particularly listening and speaking abilities. However, the analysis also revealed a gap between theoretical neuroscience findings and their practical application in language teaching and intervention. Although neuroscience and storytelling are strongly interconnected, the visualization of application clusters shows limited scope, highlighting the need to develop research methodologies that directly link neuroscience outcomes to concrete language learning and therapy practices.

Additionally, there is a lack of research examining the interactive dynamics between listening and speaking skills in children's social and developmental contexts. While keywords such as child and communication are present, there is little explicit integration regarding how listening and speaking co-develop within social interactions, such as interactive storytelling, discussions, or cooperative learning. This represents a promising research avenue to explore these interrelated skills in a more holistic framework of language development.

Keywords related to technology, such as technology and designing, appeared isolated and lacked strong integration with the main clusters linking narrative, neuroscience, and language. This indicates limited research on how digital technologies, interactive media, or AI applications can effectively support listening and speaking skills through neuroscience-based storytelling approaches. Additionally, there is a research gap concerning language disorders and neuroscience-based interventions. The presence of autism in a small cluster highlights limited literature connecting neurodevelopmental disorders with storytelling or neuroscience-informed communication strategies. Focused research is needed to develop targeted

interventions that optimize listening and speaking abilities in these populations.

The differences in focus between the two topics become evident when analyzing the keyword maps. Research on imagination processes emphasizes internal cognitive mechanisms such as mental imagery, memory, emotion, and motor control, and their relevance to creativity and the arts, reflecting a mechanistic and fundamental approach aimed at understanding how the brain processes imagination and forms subjective human experiences. In contrast, storytelling research is more oriented toward multidisciplinary applications, integrating narrative with education, literature, communication design, social skill development, leadership, and mental health. This shift illustrates a transition from fundamental understanding to applied approaches leveraging narrative as a cognitive and emotional strategy for influencing behavior and learning.

3.2.1 Analisis Interaksi Neuroscience, Imagination, Dan Storytelling

1. Neuroscience as a Cognitive Basis
Both visualizations highlight neuroscience as the central hub, serving as the primary connecting point for various surrounding concepts such as brain, memory, mind, emotion, mental imagery, and other cognitive activities. Neuroscience plays a key role in explaining the brain mechanisms that support imagination processes and storytelling abilities. Research in neuroscience reveals how the brain processes information, recalls memories, constructs imagined scenarios, and engages emotionally with narratives.

2. The Role of Imagination
Imagination is positioned in close proximity and strongly connected to neuroscience, as well as to subthemes such as self, acting, mental imagery, memory, and attention. This demonstrates that imagination acts as a bridge between brain functions and practical applications of storytelling and language. Imagination serves as a cognitive resource enabling individuals to construct stories mentally (mental imagery) and to project novel situations or experiences that have yet to occur.

3. Storytelling as Cognitive Expression and Communication
In the third visualization, storytelling emerges as a key node linked to neuroscience, technology, children, and literature. This reinforces the notion of storytelling as a complex medium of communication, integrating narrative structure, emotion, perspective,

and modern technological tools. Storytelling also requires listening (receiving narratives) and speaking (delivering narratives) skills, thus establishing a strong relationship with language development.

4. Relevance to Listening and Storytelling Skills in Language Development

Listening Skills: Neuroscience maps essential components such as attention, memory, and language processing necessary for effective listening. Imagination supports mental visualization of auditory information, thereby deepening comprehension. In storytelling, listening skills allow audiences to capture both narrative flow and conveyed meaning.

Storytelling Skills: These involve the ability to cohesively integrate memory, imagination, and speech. Neuroscience provides insight into how the brain organizes stories and how emotion and imitation contribute to effective narrative expression.

4 CONCLUSIONS

The primary focus on neuroscience, imagination, and storytelling demonstrates that neuroscience serves as a central research domain with strong connections to other topics such as imagination, mental imagery, brain, and mind. This indicates that current research is heavily concentrated on understanding brain functions and cognitive processes as the foundation for imagination and storytelling. Moreover, there is a strong interconnection between imagination and neuroscience. Imagination, as a key node, is highly associated with neuroscience and various cognitive concepts such as memory, attention, mental imagery, and emotion. This highlights imagination as a critical concept that bridges neurocognitive processes with mental actions and creative expression.

Storytelling, as a complex application of neuroscience and imagination, emerges as a central topic linked to technology, children, and literature. This reflects storytelling as an applied domain integrating narrative, emotional aspects, and social as well as technological interactions, which are strongly influenced by the advancement of neuroscience and imaginative capabilities. Overall, the three keywords—neuroscience, imagination, and storytelling—form an interconnected core in understanding children's cognitive processes and creative expression. The analysis also highlights emerging attention toward future and technology concepts, which have the potential to become new and evolving research areas. The technological dimension within storytelling and neuroscience paves

the way for integrative studies that combine digital advancements and neurobiological perspectives. Such cutting-edge research creates opportunities to explore the integration of digital technology and future-oriented concepts, particularly in the context of language education and applied neuroscience.

5 RECOMMENDATIONS

This study provides a novel contribution by connecting neuroscience research on imagination processes with storytelling practices through a bibliometric analysis approach. Several research gaps were identified that can guide future investigations: (1) integration of neuroscience and storytelling in language education, particularly to enhance children's listening and storytelling skills; (2) explicit exploration of imagination as a mediator linking cognitive processes with storytelling practices; (3) examination of the impact of digital technologies on brain mechanisms, imaginative capacity, and storytelling in language development; (4) multimodal studies integrating neurofeedback, psychology, and linguistics to capture real-time cognitive processes during listening and storytelling; (5) interdisciplinary experimental research involving neuroscience, developmental psychology, and linguistics to deepen understanding of storytelling-based learning; (6) investigation into how imagination can be cultivated and utilized as a mediator in children's language skill development with clear cognitive and neurobiological measures; (7) utilization of digital storytelling technologies to improve listening and storytelling skills through neural stimulation and enhanced imaginative capacity; and (8) development of neurofeedback-based interventions and cognitive training to support language learning that incorporates storytelling and imagination.

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