

Mapping Themes and Gaps in Waldorf Early Childhood Education Research: A Scoping Review Using Text Mining

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ABSTRACT. This study presents a scoping review of Waldorf early childhood education, using text mining to identify key themes and gaps in the existing literature. Established by Rudolf Steiner, Waldorf education prioritizes holistic development through an arts-integrated, child-centered pedagogy. The research systematically analyzes 21 articles, revealing significant trends in Waldorf early childhood education. It identifies three primary clusters: Learning and Development Context, which emphasizes sensory exploration and imaginative play; Assessment and Comparative Approaches, which focus on evaluation methods and comparisons with other educational philosophies; and Creativity in Early Childhood Education, which highlights the importance of creative expression in fostering emotional and social growth. This review enhances understanding of Waldorf education's relevance in contemporary settings while underscoring the necessity of play-based learning and qualitative assessment methods. The findings advocate for ongoing exploration of how Waldorf principles can be integrated into mainstream educational practices, ensuring that holistic child development remains a central focus.

Keywords: Waldorf education, early childhood education, holistic development, alternative education, text mining

Introduction

Early childhood education has witnessed diverse pedagogical approaches throughout its evolution, among which Waldorf education stands as a distinctive paradigm. Established by Rudolf Steiner in 1919, this educational philosophy has emerged as a significant alternative pedagogical framework, characterized by its arts-integrated curriculum and nature-based, child-centered approach that emphasizes holistic development (Steiner, 1996; Taplin, 2024; Uhrmacher, 1995). The pedagogical movement, which originated in Stuttgart, Germany, has demonstrated remarkable global expansion, currently encompassing more than 1,000 Waldorf schools and approximately 2,000 Waldorf kindergartens worldwide.

Grounded in anthroposophy, Steiner's philosophical framework, Waldorf education conceptualizes child development through a holistic lens that integrates physical, emotional, social, and cognitive domains. This comprehensive approach has garnered increasing attention from educational researchers and practitioners, as empirical evidence continues to emerge supporting its effectiveness in fostering multifaceted child

development. The pedagogical framework's adaptability across diverse cultural contexts while maintaining its fundamental principles has contributed to its sustained relevance in contemporary educational discourse.

The synthesis of theoretical foundations and practical applications in Waldorf education presents a rich area for academic inquiry, particularly in understanding its contributions to early childhood development. This pedagogical approach's emphasis on developmentally appropriate practices aligns with current educational research on optimal learning environments for young children, warranting systematic investigation into its theoretical underpinnings and practical implications.

Anthroposophy as the Philosophical Foundation

The educational philosophy of Waldorf education stems from Anthroposophy, Steiner's spiritual-scientific worldview that recognizes the interconnection between physical and spiritual realms. The term "Anthroposophy," derived from "Anthropos" (man) and "Sophia" (wisdom), reflects Steiner's comprehensive understanding of human development and education (Taplin, 2024). This philosophical foundation shapes three distinctive aspects of Waldorf education: its holistic approach to child development, the integration of arts throughout the curriculum, and its unique understanding of developmental stages (Taplin, 2024; Uhrmacher, 1995).

Development Stages Through an Anthroposophical Lens

Steiner's developmental theory divides childhood into three distinct seven-year phases, each characterized by specific developmental needs and appropriate pedagogical approaches. The first phase, from birth to age seven, is viewed as a critical phase characterized by sensory exploration, imaginative play, and learning through direct experience rather than formal instruction (Attfield, 2022; Uhrmacher, 1995). This phase focuses on physical development and learning through imitation, where children primarily learn through movement and sensory experiences (Dahlin, 2017). During this period, educators emphasize creating a nurturing environment that supports natural exploration and play-based learning (Steiner, 1996).

The second phase (7-14 years) corresponds with the development of the "feeling life" and rhythmic system. During this period, education focuses on artistic activities, storytelling, and rhythmic learning experiences that engage children's imagination and emotional capacities (Uhrmacher, 1995). Teachers serve as authority figures who guide children through pictorial and imaginative learning experiences (Steiner, 1996; Uhrmacher, 1995; Wilson, 2014).

The third phase (14-21 years) marks the development of independent thinking and judgment. During this period, education emphasizes abstract thinking and the development of critical reasoning skills, allowing students to form their own opinions and judgments about the world (Steiner, 1996; Uhrmacher, 1995).

This segmentation mirrors contemporary developmental theories that emphasize the importance of age-appropriate pedagogical strategies. For example, research indicates that Waldorf education fosters an environment conducive to holistic development, integrating cognitive, emotional, and artistic dimensions, which is consistent with findings in modern educational psychology (Aljabreen, 2020; Hallam et al., 2016). The emphasis on sensory experiences and art in early childhood education aligns with contemporary views that advocate for experiential learning as a means to enhance cognitive and social skills (Machado & Stoltz, 2016; Aljabreen, 2020).

Contemporary Research Landscape

Contemporary research on Waldorf education has demonstrated the effectiveness of its distinctive pedagogical approach, particularly in early childhood settings. Studies have highlighted positive outcomes in children's holistic development, including enhanced creativity, social competence, and emotional well-being (Rose

& Jolley, 2020). The integration of arts throughout the curriculum has been recognized as a key factor in fostering aesthetic sensitivity and supporting comprehensive child development (Chou, 2014). This aligns with some contemporary research in the mainstream educational context regarding the special role of art in early childhood (e.g., Cutcher & Boyd, 2016; Machado & Stoltz, 2016).

Comparative research has positioned Waldorf education within the broader landscape of alternative pedagogies. While sharing some commonalities with approaches like Montessori and Reggio Emilia in their emphasis on practical activities and respect for natural development, Waldorf education distinguishes itself through its unique focus on artistic expression and imaginative play (Aljabreen, 2020). These comparative studies have examined philosophical foundations, pedagogical practices, and practical implementations across different educational approaches (e.g. Aljabreen, 2020; Goldshmidt, 2021; Edwards, 2020).

The adaptability of Waldorf education has been particularly noteworthy, as evidenced by its successful implementation across diverse cultural contexts. Recent developments show increasing integration of Waldorf methods into public education systems, demonstrating the approach's potential for broader application (e.g., Rose & Jolley, 2016; Shank, 2016; Wylie & Hagan, 2003). Contemporary research also addresses emerging challenges, such as the integration of technology and cultural responsiveness in Waldorf settings (Neumann, 2024; Wilson, 2022).

Research has also explored the outcomes of Waldorf education compared to mainstream educational approaches. These studies have contributed to discussions about the potential applications of alternative educational methods in conventional settings, particularly regarding holistic development and creative expression (Rose & Jolley, 2016). The growing body of research suggests that while maintaining its core principles, Waldorf education continues to evolve and adapt to contemporary educational needs while preserving its fundamental commitment to nurturing the whole child.

Although there are already some reviews on Waldorf education (e.g., Böhle & Peters 2010, 2011; Peters, 2020; Tyson, 2023, 2024), research on Waldorf education remains relatively understudied compared to the extensive literature available on other alternative approaches like Montessori education in early childhood settings (Guerrero et al., 2024; Mavrellos & Daradoumis, 2020) as well as mainstream education systems, particularly in early childhood education. As Tyson (2024) notes in his comprehensive empirical survey by searching on not only Research on Steiner Education (RoSE) journal, but also those published on recognized science publishers and peer-reviewed journals, while approximately 250 studies on Waldorf education exist, there is significantly less research specifically focused on early childhood education (i.e. 0-7 years old) compared to research on Waldorf schools generally. This gap is particularly noteworthy given that there are numerically more Waldorf preschools than schools (Tyson, 2024). Besides, several studies regarding the review of research studies on Waldorf education (e.g., Böhle & Peters, 2010, 2011; Peters, 2020) were written in German, which has its limitations in accessibility for a non-German-speaking audience.

The movement's emphasis on holistic development, arts integration, and child-centered learning offers valuable insights for contemporary education, with its survival and growth suggesting the enduring relevance of its core principles across diverse cultural contexts (Taplin, 2024). While both Peters (2020) and Tyson (2023, 2024) surveys document substantial research activity, the limited research specifically on Waldorf early childhood education presents three significant challenges. First, insufficient empirical evidence makes it difficult to fully understand how Waldorf principles translate into contemporary educational settings. Second, the lack of systematic analysis impedes the identification of best practices and areas requiring improvement. Third, the absence of comprehensive research hinders the potential integration of successful Waldorf practices into mainstream education systems. These challenges underscore the need for more rigorous research to understand and potentially leverage Waldorf education's unique contributions to early childhood education. Notably, Tyson's reviews (2023, 2024) identify divergent sets of studies with respect to both theoretical and empirical aspects. While drawing attention to those pertaining to early childhood education, the level of analysis is largely descriptive and lacks deeper synthesis, signaling an area for future analytical development.

The Current Study

The current study aims to build upon existing literature by employing text mining techniques to analyze key themes within research on Waldorf early childhood education. By systematically reviewing articles related to this educational philosophy, this study seeks to identify prominent trends and gaps in literature. The research goals include:

Goal #1: To identify major themes related to Waldorf early childhood education through text mining analysis.

Goal #2: To explore how recent research aligns with or diverges from traditional Waldorf principles.

Goal #3: To highlight areas within the literature that require further investigation or exploration.

Goal #4: To offer insights for educators and researchers interested in implementing or studying Waldorf education more deeply.

By addressing these goals, this study aims to contribute valuable knowledge to the field of early childhood education while reinforcing the relevance of Waldorf principles in contemporary educational contexts. Through a comprehensive analysis of existing literature using innovative methodologies like text mining, this research will provide a clearer understanding of how Waldorf education can continue to evolve while remaining true to its foundational ideals.

Method

A scoping review methodology was selected as the most appropriate approach to explore the current research landscape of Waldorf early childhood education. This methodology enables researchers to systematically map key concepts, types of evidence, and gaps in research related to a defined area, making it particularly suitable for investigating relatively under-explored topics (Arksey & O'Malley, 2005; Chiarello et al., 2023; Munn et al., 2018). To enhance the analytical rigor of this review, text mining techniques were employed, complemented by cluster analysis. This combined approach offers several distinct advantages that align closely with the objectives of this review.

Text mining facilitates the systematic extraction and analysis of meaningful patterns from large volumes of textual data, based on natural language processing (NLP) and machine learning (Berry & Castellanos, 2004; Ferreira-Mello et al., 2019; Tan, 1999). Unlike traditional qualitative methods, which rely on manual coding and are prone to subjective biases, text mining provides an objective and scalable means to uncover latent themes and relationships within literature. This is particularly valuable and helpful in understanding research landscape in fields like Waldorf education, where research is relatively limited and dispersed across various disciplines.

The following sections detail the systematic process of literature search, screening, and analysis that was undertaken.

Literature Search

A comprehensive literature search was conducted on November 18, 2024, utilizing three prominent electronic databases: Web of Science (WOS) Core Collection, Scopus, and EBSCO. These databases were selected for their established authority and widespread use in educational research reviews (e.g., Su & Yang, 2022). In each database, a search string was employed in the advanced search function: ("Waldorf" OR "Waldorf Steiner" OR "Steiner" OR "Waldorf Education" OR "Steiner Education") AND (Kindergarten* OR Preschool* OR Child* OR Young Child* OR Early Year* OR Early Childhood Education OR Childhood). The search string was developed through a dual approach, drawing from the researcher's knowledge and understandings in Waldorf (Steiner) education and consulting search strategies employed in comparable previous studies (e.g. Guerrero et al., 2024; Mavrelos & Daradoumis, 2020).

The search include peer-reviewed academic articles published in English only, with no date restrictions applied. This systematic approach yielded an initial corpus of 325 articles across the three databases, including duplicate entries. The entire search procedure followed the updated 2020 Preferred Reporting Items for Systematic reviews and Meta-Analyses (PRISMA) guidelines (Page et al., 2021), and was systematically documented and visualized in a PRISMA flow diagram, ensuring transparency of the review process. This rigorous approach to literature identification established a solid foundation for the subsequent phases of screening and analysis.

Inclusion and Extension Criteria

This review focused on articles examining Waldorf education in early childhood contexts. In this review, Waldorf education was defined as educational approaches, pedagogies, or curricula that incorporate Rudolf Steiner's educational philosophy or Anthroposophy, including education delivered in Waldorf or Steiner schools.

The age parameter was specifically set from birth to seven years, aligning with Steiner's developmental stages theory, which identifies this period as the pre-formal schooling phase (Steiner, 1996). Due to the relatively limited research in this field, the review incorporated a broad spectrum of study types, encompassing curriculum analyses, developmental outcome studies, comparative analyses between Waldorf and other educational approaches, and studies examining stakeholder perceptions. Both empirical and theoretical papers were considered eligible for inclusion. Studies were excluded from the review if they met any of the following criteria: (1) failed to specify a target age group; (2) focused on age groups extending beyond or partially outside the birth-to-seven range; (3) did not primarily focus on Waldorf (Steiner) education or only mentioned it peripherally. A comprehensive overview of these inclusion and exclusion criteria is presented in Table 1.

Table 1
Inclusion and exclusion criteria

Criteria Category	Inclusion Criteria	Exclusion Criteria
Educational Context	Education approaches/curricula based on Rudolf Steiner's educational philosophy or Anthroposophy	Educational approaches not related to Waldorf/Steiner philosophy
Focus	Primary focus on Waldorf (Steiner) education in early childhood context	Waldorf (Steiner) education mentioned only peripherally or not the main focus of study
Age Group	Studies targeting children from birth to seven years old	Studies that do not specify age group or focus on ages beyond/partially outside birth-to-seven range

Screening Processes

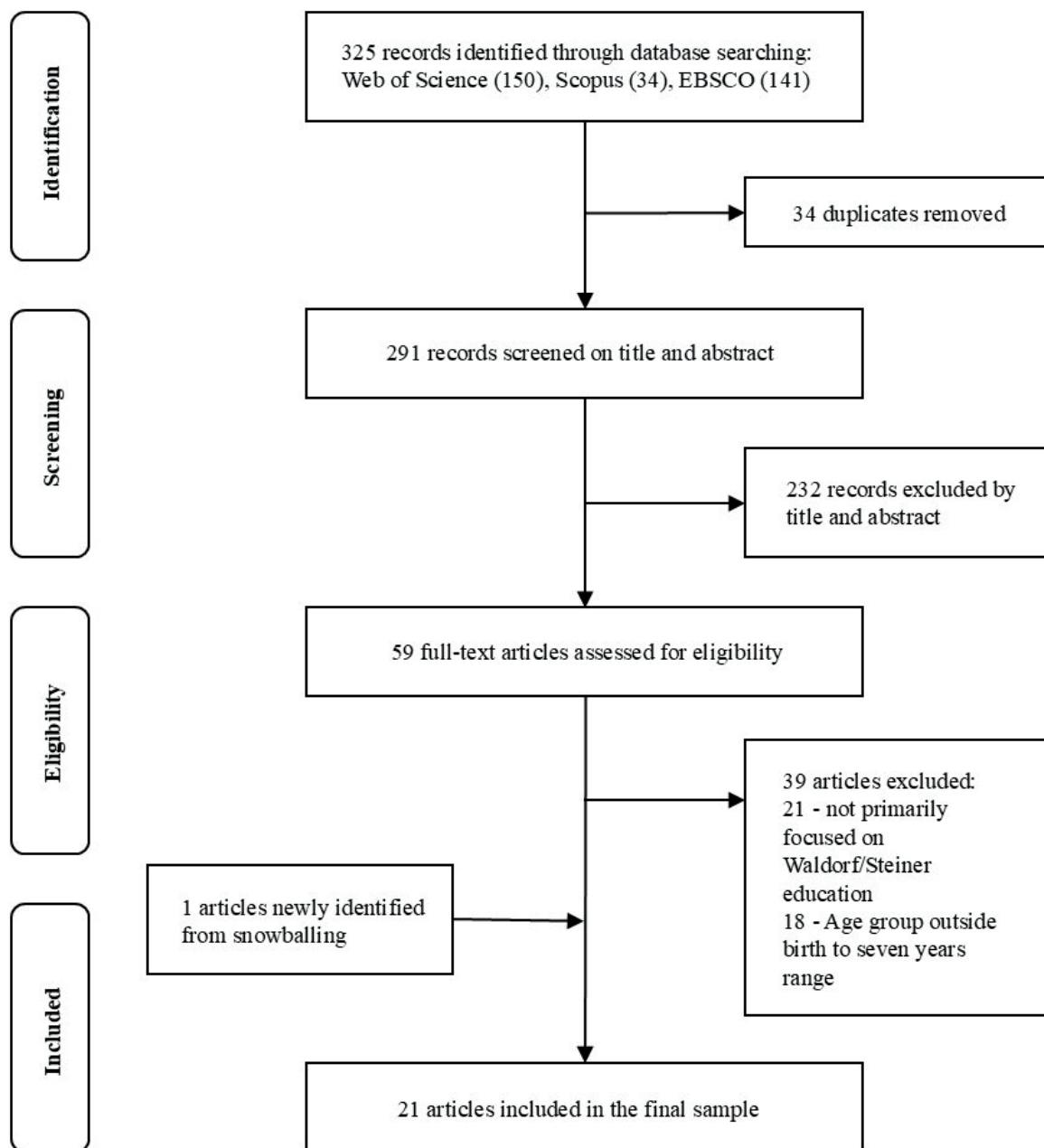
The initial database search yielded 325 articles, from which 34 duplicates were removed, leaving 291 articles for screening.

The screening process was conducted in two phases. The first phase involved reviewing titles and abstracts against predetermined inclusion and exclusion criteria, resulting in the identification of 59 potentially relevant articles. After that, a full-text screening was performed on these papers to ensure consistency with

the inclusion criteria, leading to the exclusion of 39 articles that did not meet the established criteria. This process resulted in 20 articles being retained for analysis.

To ensure comprehensive coverage of the literature, the snowballing method (Wohlin, 2014) was employed to examine the reference lists of the included articles. This additional step, conducted using the same eligibility criteria, identified one additional relevant article, bringing the final sample to 21 articles for analysis (see Appendix A for article summaries). The screening process and its outcomes are illustrated in Figure 1, which presents the number of papers included and excluded at each stage of the review process.

Figure 1
PRISMA diagram of included articles in the scoping review



Data Analysis

Text mining techniques were employed to identify major research themes in Waldorf early childhood education. Text mining involves the use of various techniques from natural language processing (NLP) and machine learning (Arksey & O'Malley, 2005; Chiarello et al., 2023; Munn et al., 2018). This method enables researchers to analyze vast amounts of textual data. All analyses were conducted using R software (R Core Team, 2023).

Step 1: Data Processing

The data preprocessing involved systematic steps to prepare the 21 articles for analysis. The process utilized several R packages, including *tm* (Feinerer & Hornik, 2024) for text mining operations and *SnowballC* (Bouchet-Valat, 2023) for word stemming.

First, a manual review was conducted to remove:

- Formatting elements (graphs, tables, figures, footnotes)
- Section headers (abstract, introduction, method, data analysis, results, summary)
- Table and figure identifiers (table, fig)
- Peripheral content (headers, footers, titles, abstracts, keywords, references, author information, funding statements)

After manual cleaning, the content was then processed using the *tm* package (Feinerer & Hornik, 2024). First, all text was converted to lowercase and all punctuations were removed, followed by the elimination of numbers. Extra whitespace was stripped as well. After basic cleaning, stop words and common terms with limited analytical value were removed. These included research-related terms like “study” and “research,” common verbs such as “can” and “use,” and other frequently occurring words that provided little analytical insight. The final preprocessing step involved word stemming using the *SnowballC* package (Bouchet-Valat, 2023), which reduced words to their root form by removing suffixes such as “-s,” “-ed,” and “-ing.” This systematic approach to text preprocessing ensured that the resulting corpus was clean and standardized for subsequent analysis while maintaining the integrity of meaningful content.

Step 2: Term Frequency analysis

A document-term matrix (DTM) was created to analyze word frequencies across the corpus. Initial analysis identified the 50 most frequent terms. After removing noise words (e.g., “time,” “year,” “make,” “howev,”), 37 key terms remained for further analysis. The frequency distribution was visualized through bar plots and word clouds using the *ggplot2* (Wickham et al., 2024) and *wordcloud* (Fellows, 2018) packages.

Step 3: tf-idf Analysis

Term Frequency-Inverse Document Frequency (TF-IDF) analysis was performed using the *weightTfIdf* function from the *tm* package (Feinerer & Hornik, 2024). This analysis weighted the frequency of terms in individual documents against their frequency across the entire corpus, helping identify terms that were particularly significant to specific documents while accounting for their overall prevalence in the collection.

Step 4: Clustering analysis

Hierarchical clustering was performed on the term co-occurrence matrix using Ward's method (*ward.D2*). To determine the optimal number of clusters, three validation metrics were employed:

- The elbow method, examining the within-cluster sum of squares

- The silhouette score, measuring cluster cohesion and separation
- The Davies-Bouldin index, evaluating cluster compactness

The selection of the final number of clusters was based on both quantitative metrics and qualitative assessment of cluster interpretability.

Results

Both Figure 2 and Figure 3 illustrate the frequent words in the selected articles, after removing the noise words. The most frequently occurring term was “child” with 2,773 occurrences, almost three times of the second frequent appeared word “educ” (957). It emphasized the child-centered nature of Waldorf early childhood education. Educational terminology formed the next frequency tier, with “play” (821) and “Waldorf” (781) being prominent.

Figure 2
*Frequency Distribution of Frequent Terms in Waldorf Early Childhood Education Literature
(After Noise Word Removal)*

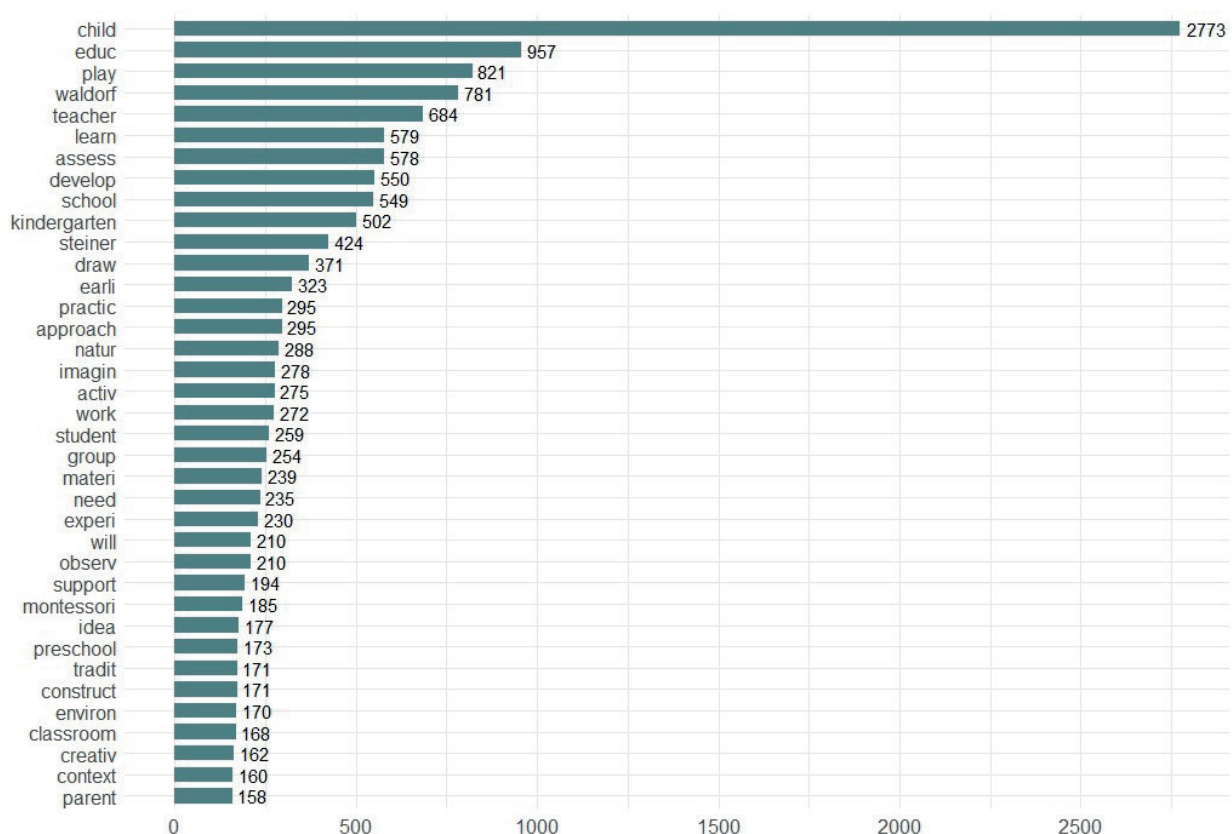


Figure 4
Clustering Validation Metrics for Term Analysis in Waldorf Early Childhood Education Literature

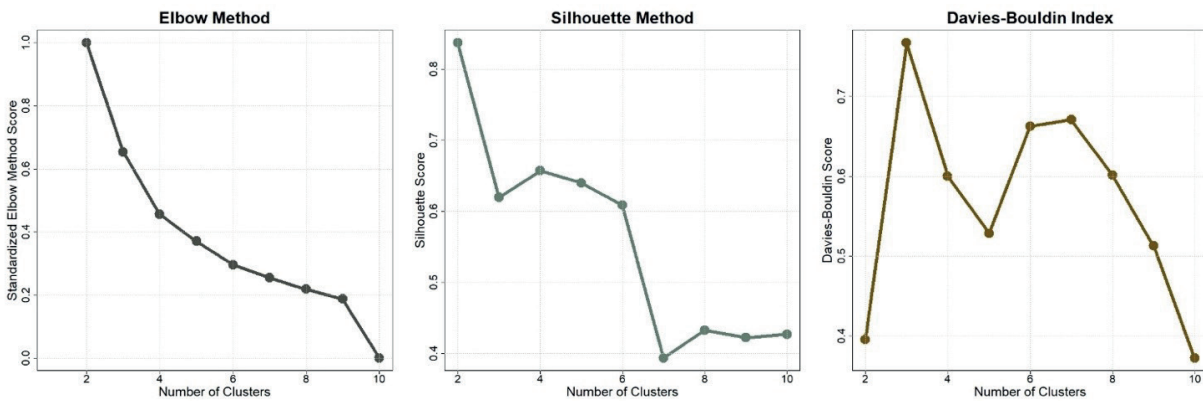


Table 3
Cluster Solutions for 10-Cluster, 3-Cluster, and 2-Cluster

Cluster Number	Number of Clusters		
	10 Clusters	3 Clusters	2 Clusters
Cluster 1	activ, approach, child, context, develop, educ, experi, group, natur, need, observ, steiner, support, will, work	activ, approach, child, classroom, construct, context, develop, draw, earli, educ, environ, experi, group, idea, imagin, learn, materi, natur, need, observ, parent, play, practic, school, steiner, support, teacher, waldorf, will, work	activ, approach, child, classroom, construct, context, creativ, develop, draw, earli, educ, environ, experi, group, idea, magin, kindergarten, learn, materi, natur, need,observ, parent, play, practic, preschool, school, steiner, student, support, teacher, tradit, waldorf, will, work
Cluster 2	assess	assess, montessori	assess, montessori
Cluster 3	classroom, earli, environ, idea, learn, materi, parent, play, practic, school, teacher, waldorf	creativ, kindergarten, preschool, student, tradit	
Cluster 4	construct		
Cluster 5	creativ		
Cluster 6	draw		
Cluster 7	imagin		
Cluster 8	kindergarten, student, tradit		
Cluster 9	montessori		
Cluster 10	preschool		

At the phase of qualitative evaluation, the ten-cluster solution was excluded due to its introduction of unnecessary complexity, which hindered meaningful interpretation of the clusters. The smaller cluster solutions provided clearer thematic distinctions that aligned more closely with the primary topics discussed in the literature. In comparison to the two-cluster solution, the additional cluster in the three-cluster solution enhanced thematic richness and interpretability. This was also more beneficial for practitioners and

researchers in the field, as it delineated specific areas for further investigation or application. The resulting clusters are characterized in the following subsections.

Discussion

The present study reviewed the literature on Waldorf early childhood education through the application of text mining techniques. The analysis resulted in the identification of three distinct clusters that encapsulate the main themes within the existing research on this topic. These clusters provide insights into how Waldorf education aligns with Rudolf Steiner's educational philosophy and pedagogical principles.

The results of the clustering analysis provide valuable insights into the thematic structure of the literature on Waldorf early childhood education. The three distinct clusters identified: Learning and Development Context, Assessment and Comparative Approaches, and Creativity in Early Childhood Education. This highlights the multifaceted nature of this educational philosophy and its application in various contexts.

Cluster #1: Learning and Developmental Context

This largest cluster, containing terms like “approach,” “child,” “classroom,” “natur” and “environ,” reflects Steiner's fundamental understanding of child development as a gradual unfolding of physical, emotional, and spiritual capacities. The prominence of terms such as “natur,” “play,” and “imagin” aligns with Steiner's emphasis on creating nurturing environments that support natural exploration and play-based learning. These themes align with Waldorf education's core principles of supporting holistic development and individualized learning experiences (e.g., Attfield, 2022; Chou, 2014; Frödén & Rosell, 2019; Goldshmidt, 2020; Guilbaud, 2019; Knight, 2024; Kodsí, 2022; Nome, 2024; O'Connor & Angus, 2014; Sobo, 2014; Taplin, 2024; Waite & Rees, 2014; Wilson, 2022).

However, critical perspectives within this cluster reveal important tensions in Waldorf education's approach to naturalism and child-centeredness. Knight (2024) critically examines how colonial legacies influence Waldorf educators' understanding of childhood, revealing that assumptions about children being “close to nature” are not culturally neutral and can perpetuate racism and ableism. This challenges the seemingly benign association of terms like “natur” and “play” in the literature, highlighting how these concepts may reinforce Western, middle-class conceptions of childhood rather than genuinely embracing diverse cultural perspectives on child development. Wilson's (2022) work contributes to a growing body of critical scholarship that challenges the universalist claims of Waldorf education. By arguing that its methods may impose norms rather than foster freedom, Wilson's analysis aligns with broader critiques that identify Waldorf as a culturally specific, and often exclusionary, practice rooted in Eurocentric ideals.

This cluster strongly reflects Steiner's understanding of child development, particularly his emphasis on the first seven-year phase characterized by sensory exploration and imaginative play (Steiner, 1996; Uhrmacher, 1995). The prominence of terms like “natur” and “play” in this cluster aligns with Steiner's belief in creating nurturing environments that support natural exploration and play-based learning (Steiner, 1996). Furthermore, the inclusion of terms such as “will” and “imagin” echoes Steiner's ideas about the development of the child's etheric body during this stage, emphasizing the importance of fostering imagination and willpower through appropriate pedagogical approaches (Steiner, 1996; Taplin, 2024).

Cluster #2: Assessment and Comparative Approaches

The second cluster, comprising “assess” and “montessori,” reflects research focused on evaluation methods and comparative educational philosophies. Several studies have explored assessment strategies within Waldorf education (Arslan & Kartal, 2022; Becker et al., 2023; Deluca et al., 2019), while others have conducted comparative analyses between Waldorf and Montessori pedagogical approaches (Aljabreen, 2020; Kvintova

et al., 2022). This clustering highlights the scholarly interest in understanding how different educational frameworks evaluate child development and learning outcomes.

The presence of “assess” suggests an increasing focus on how Waldorf schools evaluate children’s progress in alignment with Steiner’s emphasis on holistic development over standardized assessment (Steiner, 1996). Recent research indicates that while Waldorf schools traditionally employ qualitative observational assessments that prioritize individual growth, there is also a need to understand how these methods compare to mainstream practices (Becker et al., 2023). This comparative perspective is crucial as it reflects broader educational trends toward comprehensive assessment approaches that consider the whole child rather than just academic achievement.

Moreover, examining assessment practices across different alternative educational approaches provides insights into children’s outcomes. By comparing Waldorf education with Montessori or Reggio Emilia methodologies, researchers can better understand how these non-mainstream educational philosophies address early childhood development within their unique frameworks (e.g., Aljabreen, 2020; Kvintova et al., 2022). This comparison not only enriches our understanding of alternative pedagogies but also informs discussions about their potential integration into mainstream educational systems.

Cluster #3: Creativity in Early Childhood Education

The third cluster contains terms such as “creativ,” “kindergarten,” “preschool,” “student,” and “tradit.” This cluster underscores the central importance of creativity and innovation in Waldorf philosophy. It highlights themes related to early childhood education settings, creativity, and traditional practices. Articles related to this cluster emphasize creativity and demonstrate a commitment to nurturing individual expression and imaginative play among students (e.g., Rose & Jolley, 2020; Taplin, 2024).

Creativity is one of the cornerstone of Waldorf education, which integrates artistic activities throughout all aspects of the curriculum rather than treating them as isolated subjects. This integration fosters children’s innate creativity while developing essential skills like fine motor control and focused attention (Steiner, 1996; Taplin, 2024). The emphasis on imagination aligns with Steiner’s belief that artistic expression is vital for healthy child development during early years. The presence of terms related to creativity suggests that educators recognize its significance not only for individual expression but also for fostering social skills and emotional resilience among young learners.

Reflections on the Methodology and Findings

Given the relative novelty of text mining as a methodology in educational research, it is crucial to reflect on its application and the contributions it has made to the current study’s findings. It is important to acknowledge that this scoping review’s text mining approach, while systematic and comprehensive, inherently prioritizes thematic identification over a deep, qualitative analysis of power relations, contradictions, and problematic aspects within the literature. The methodology’s focus on frequency-based clustering may inadvertently obscure contentious issues that appear less frequently but are theoretically significant, such as the colonial legacies identified by Knight (2024) or the control mechanisms revealed by Wilson (2022). This limitation is particularly relevant given that critical studies often appear as outliers in a field where much research takes a more descriptive or supportive stance toward Waldorf education.

The apparent consensus revealed through clustering analysis should therefore be interpreted with caution, as it may reflect a publication bias toward supportive research rather than a genuine absence of problems within Waldorf early childhood education. The critical perspectives identified, though numerically limited, raise fundamental questions about the assumptions underlying Waldorf pedagogical practices and their cultural implications that merit serious consideration.

Implications for Future Research

The findings from this scoping review and text mining analysis of Waldorf early childhood education literature reveal several important implications for educators, researchers, and policymakers. The identification of three distinct clusters provides a structured framework for understanding the multifaceted nature of Waldorf education and its alignment with Rudolf Steiner's educational philosophy.

The implications of the findings of Cluster #1 suggest that educators should continue to focus on creating environments that foster sensory exploration and imaginative play. By aligning teaching practices with Steiner's developmental stages, educators can better support the individual needs of children during this critical period of growth. Future research could further investigate how specific environmental factors influence children's learning experiences in Waldorf settings. For instance, studies could explore the impact of natural materials versus synthetic ones on children's engagement and creativity. Additionally, the emphasis on play within this cluster highlights the need for ongoing advocacy for play-based learning in early childhood education more broadly. As educational systems increasingly prioritize standardized testing and academic achievement, it is essential to reinforce the value of play as a legitimate form of learning that contributes to children's overall development (Goldshmidt, 2020; Nome, 2024; Taplin, 2024). This advocacy can help bridge the gap between Waldorf education principles and mainstream educational practices.

The emphasis on assessment methods within Cluster #2 suggests a critical area for further exploration. This cluster suggests that further research is needed to explore how qualitative assessment practices can effectively measure children's development in ways that align with their individual learning trajectories. Comparative studies can illuminate best practices for evaluating children's progress while respecting their developmental needs. For example, research could examine how Waldorf's observational assessment methods differ from standardized assessments used in mainstream education. Understanding these differences may provide insights into how alternative educational philosophies can inform more comprehensive assessment approaches across various educational contexts.

Furthermore, the findings highlight the importance of creativity in early childhood education as represented in Cluster #3. Future research could examine how creativity is fostered within Waldorf classrooms and its effects on various aspects of child development, including cognitive, social, and emotional growth. Investigating the role of creative activities in promoting engagement and motivation among young learners would provide valuable data for educators seeking to enhance their teaching practices.

Moreover, there is an opportunity to explore the integration of technology within Waldorf education. As digital tools become increasingly prevalent in educational settings, understanding how these tools can be harmoniously integrated into Waldorf practices without compromising the philosophy's core principles will be essential (e.g., Neumann, 2024). Research could focus on developing guidelines for effectively using technology to support creative expression and collaborative learning while maintaining a child-centered approach.

Limitations

While this scoping review provides valuable insights into the literature on Waldorf early childhood education, it is not without limitations. Addressing these challenges will enhance future research efforts and contribute to a more nuanced understanding of this unique educational philosophy.

One significant limitation is related to the selection of articles included in the analysis. The review was restricted to articles published in English, which may have excluded relevant research published in other languages. This limitation could result in an incomplete understanding of global perspectives on Waldorf education and its practices.

Another limitation pertains to the text mining methodology itself. While text mining techniques are powerful tools for analyzing large volumes of text data, they may overlook contextual meanings and subtleties within language that qualitative analyses can better capture. The automated processes used in text mining

can sometimes lead to oversimplification or misinterpretation of complex concepts, which may affect the validity of findings.

Finally, this study primarily focused on identifying themes rather than establishing causal relationships or measuring outcomes associated with Waldorf educational practices. Future research should aim to address these gaps by employing mixed-methods approaches that combine quantitative metrics with qualitative insights to provide a more comprehensive understanding of how Waldorf education influences child development.

Conclusion

This scoping review employed text mining techniques to analyze the literature surrounding Waldorf early childhood education, revealing key themes and insights into the educational philosophy's implementation and impact. The analysis identified three distinct clusters: Learning Environment and Practice, Assessment and Comparative Approaches, and Creativity in Early Childhood Education. Each cluster reflects critical aspects of Waldorf education, emphasizing the holistic, child-centered approach that is foundational to this pedagogical model. The findings highlight the interconnectedness of various aspects of Waldorf philosophy, offering valuable insights for educators, researchers, and policymakers interested in early childhood education.

Future research should build upon these findings by exploring how these themes interact in practice, examining the effectiveness of specific pedagogical strategies, and investigating innovative assessment methods that align with Waldorf principles. By addressing these areas, researchers can further enrich the discourse surrounding Waldorf education and contribute to its ongoing evolution in contemporary educational contexts.

Overall, this scoping review serves as a foundational step toward a more comprehensive understanding of Waldorf early childhood education. It highlights both the strengths of this educational approach and the areas where further inquiry is needed, ultimately supporting efforts to enhance educational practices for young learners.

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Appendix A

Table A1
Research aims and main findings of the included articles

Studies	Research Aims	Main Finding
Taplin (2024)	To explore significant themes in the Waldorf approach to early childhood education, emphasizing the alignment of its foundational principles with contemporary child development research.	The main findings highlight the prioritization of social and emotional development, the creation of a sensory-friendly environment, the promotion of nature connections, the need to protect child-initiated play from academic pressures, and the importance of practitioners' inner development. This article concludes by identifying three future areas of focus for Waldorf early childhood practitioners.
Nome (2024)	To explore how child-initiated play in Waldorf kindergartens fosters the development of democratic skills through negotiations about play scripts, using participatory observations and recordings.	Findings indicate that resistance in play negotiations arises from the play materials, previous scripts, and play partners, with open-ended materials contributing greater complexity to these interactions compared to processed toys. This complexity increases the risk of negotiation failure, highlighting the unique dynamics of play in Waldorf settings.

Table 2 (continued)

Studies	Research Aims	Main Finding
Knight (2024)	To examine how North American Waldorf educators navigate colonial legacies in their understanding of childhood and the assumptions that inform the pedagogical space of Waldorf kindergartens.	The main findings reveal that these assumptions, rooted in colonial narratives about children being close to nature and home, are not neutral and perpetuate racism and ableism, impacting how educators engage with dominant Western views of childhood. This study highlights the need for awareness among educators regarding the historical contexts shaping their pedagogical practices.
Becker et al. (2023)	To explore how alternative education systems—Reggio Emilia, Montessori, and Waldorf—approach early childhood assessment in a developmentally appropriate manner.	The main findings indicate that these systems prioritize understanding each child's unique learning through engagement-focused assessments, aligning with the National Association for the Education of Young Children's (NAEYC) recommendations. Effective assessment practices include individualized techniques like observation and the use of artifacts, ensuring that assessments reflect children's interactive learning experiences.
Wilson (2022)	To critically analyze the cultural meanings of child-centeredness in US early childhood education, focusing on Waldorf education as an alternative that seeks to "protect childhood" from modern societal dangers.	The main finds indicate that, despite its child-centered claims, Waldorf education often reinforces a Western, middle-class conception of childhood and can impose adult-sanctioned norms on children rather than liberating them. The author suggests a shift towards discourses and practices that genuinely promote child liberation instead of merely maintaining regulatory frameworks.

Studies	Research Aims	Main Finding
Kvintova et al. (2022)	To evaluate the impact of various preschool education systems in the Czech Republic on psychological variables related to children's outcomes, by comparing traditional preschool programs with alternative types, including Montessori, Waldorf, and religious schools.	The findings indicated that the type of kindergarten significantly affects children's school performance motivation, attitudes toward school, and executive functions, with notable differences observed among the different educational approaches.
Kodsi (2022)	To investigate constructive play within Waldorf and normative kindergartens in Israel, focusing on children's construction outputs through problem-solving and technological thinking.	The findings reveal that 86% of construction activities in Waldorf preschools are directed towards socio-dramatic play, significantly higher than the 35% observed in normative preschools. This indicates that constructive play is a central element in Waldorf education and supports various forms of play.
Attfield (2022)	To explore the philosophy and practices of early childhood Waldorf education in the US and UK, focusing on its child-centered and inclusive principles.	The findings reveal contrasting interpretations among kindergarten teachers regarding the education of diverse learners, highlighting situational differences between US and UK contexts while maintaining a shared educational ethos rooted in anthroposophy. The study recommends enhancing transnational networks within Waldorf early childhood studies and connecting with broader educational discussions on inclusion.
Arslan & Kartal (2022)	To evaluate the impact of Waldorf approach activities, supported by cooperative methods, on early number assessment skills in children aged 48-60 months.	The findings revealed that the experimental group demonstrated statistically significant improvements in their early number skills compared to the control group, which showed only minor increases.
Rose & Jolley (2020)	To investigate the creative intentions behind drawing among pupils from mainstream and Steiner schools.	The research found that while both groups drew from similar sources for their ideas, such as immediate surroundings and memory, Steiner pupils expressed a greater focus on expressive ideas, highlighting that children utilize diverse sources for drawing inspiration influenced by their educational environments.
Goldshmidt (2020)	To evaluate the appropriateness of practicing meditative techniques with children in school settings, particularly through a philosophical and moral lens, by comparing mindfulness practices with Waldorf education.	The findings suggest that while meditative techniques can offer significant benefits for children's emotional and cognitive development, their appropriateness in school settings remains contentious, necessitating a careful balance between direct spiritual practices and the preservation of childhood innocence.
Aljabreen (2020)	To analyze the Montessori, Waldorf, and Reggio Emilia educational models, focusing on their historical development, philosophical frameworks, benefits, and challenges within the context of evolving early childhood education.	The main findings highlight that these alternative approaches prioritize children's educational freedom and holistic development while also addressing the need for educators to adapt these models to local cultural contexts amidst increasing academic pressures.
Guilbaud (2019)	To explore the influence of Waldorf principles on parenting practices and the intergenerational transmission of early childhood experiences.	The main findings indicate that the practice of Waldorf education fosters a nurturing environment that emphasizes emotional development, sensory engagement, and a connection to nature, which may shape future parenting styles and mothering inclinations.

Studies	Research Aims	Main Finding
Deluca et al. (2019)	To examine and synthesize research across Reggio Emilia, Waldorf, and Montessori kindergarten traditions to develop key assessment tenets that can inform public education policy and practice.	The study identified three core priorities for kindergarten assessment: child-centered and developmentally appropriate teaching, continuous embedded formative assessment, and use of multiple assessment methods, along with four iterative processes that facilitate assessment practices including participation in teaching/learning, reconstruction of teaching/learning, assessment dialogues, and feedback integration.
Frödén & Rosell (2019)	To investigate how the relationship between children, toys, and the Waldorf preschool educational environment influences children's imagination development.	Three key factors were identified as influencing children's imaginative development: the form of the toys, their placement, and the teachers' pedagogical intentions and interactions with children.
Wilson (2014)	To critically examine Waldorf education through ethnographic research and discourse analysis, focusing on how its pedagogical practices relate to adult control and conceptions of childhood.	The study revealed that despite its reputation for educational freedom, Waldorf education operates through strict routines and adult control over children's activities, bodies, and language, with teachers' discourse patterns reinforcing their authority and deficit-based views of child development.
Waite & Rees (2014)	To examine how empathy and imagination are nurtured in Steiner kindergartens through a collaborative study between Steiner practitioners and mainstream UK educators, while exploring how these practices might benefit other early years settings.	The study revealed that imaginative play in Steiner kindergartens provides effective practice in empathy development and prosocial behavior, demonstrating potential long-term benefits for children's ethical development and fulfilling lives.
Sobo (2013)	To examine Waldorf education's unique approach to play and its underlying cultural model of child development by analyzing how teachers orchestrate play in pre-k/kindergarten classrooms.	While this approach offers insights for implementing play in non-Waldorf settings, the study reveals that Waldorf education still contends with the work-play dichotomy prevalent in US education, using play's pedagogical benefits as a marketing advantage.
O'Connor and Angus (2014)	To examine Steiner Waldorf's perspective on school readiness and apply it to Ireland's educational context, while analyzing the case for delayed school entry.	The study supports a later school start age as beneficial for children's long-term learning capacity and enthusiasm, with evidence suggesting that delaying formal education aligns with child-centered developmental principles.
Chou (2014)	To investigate how parents-support creative play affects aesthetic sensibility and creativity among Waldorf preschool children in Taiwan.	The study demonstrated that parent-supported creative play positively influenced children's aesthetic sensibility (specifically in exploration, awareness, expression, and creation) and enhanced their creative originality, while qualitative observations showed increased willingness for creative expression in colorful imagery and storytelling through drawings.
Burkitt et al. (2005)	To investigate whether children from different educational backgrounds (Steiner vs. mainstream schools) demonstrate different patterns in their use of size and color when drawing figures with varying emotional characteristics.	While mainstream school children drew larger figures overall, both groups showed similar scaling patterns in response to emotional characteristics, but differed specifically in their color choices for negatively characterized figures.