

Artificial Intelligence in Preschool Assessment: Interpreting Children's Drawings as a Diagnostic Medium

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Abstract: This study explores the potential of integrating Artificial Intelligence (AI) in the analysis of preschool children's drawings as a non-verbal medium that reflects their cognitive and emotional development. In the context of early childhood education, drawings function not only as artistic expressions but also as symbolic representations of children's thoughts, emotions, and perceptions of their surroundings. Adopting a qualitative research design, data were collected through visual analysis of 13 drawings alongside unstructured interviews with teachers and pupils. Generative Pre-Trained Transformer (GPT Vision) technology was employed to identify visual elements including lines, shapes, forms, spatial arrangements, and narrative symbols guided by Viktor Lowenfeld's Artistic Development Model and the Structured Visual Content Analysis Model. The findings reveal consistent visual patterns that illustrate cognitive growth (such as differentiation of forms, textures, and spatial concepts) as well as emotional tendencies expressed through symbols and composition. The integration of AI enabled more nuanced interpretations while minimizing bias, thereby enhancing the accuracy of assessment. The study recommends the adoption of AI-driven digital assessments that are responsive to children's developmental progress, while reaffirming the role of teachers as visual interpreters and facilitators. Overall, the implications highlight the importance of inclusive, adaptive, and future-oriented pedagogical approaches that resonate with the aspirations of the Fifth Industrial Revolution (IR 5.0).

Keywords: Artificial Intelligence, Generative Pre-Trained Transformer (GPT Vision), Children's Drawing Analysis, Visual Literacy, Early Childhood Education, Emotional Development, Cognitive Development

1.0 Introduction

Drawing constitutes a significant non-verbal channel of communication among preschool children, particularly in expressing their emotions, thoughts, and understanding of their environment. Within the framework of early development, drawings function not only as therapeutic artistic activities but also as alternative diagnostic instruments capable of unveiling cognitive and emotional dimensions in symbolic and visual form [8]. Through this medium, children are able to articulate experiences and emotions that are difficult to verbalize, thereby providing educators, psychologists, and early childhood researchers with a rich source of developmental data.

Aligned with the Fourth Industrial Revolution, the exploration of technology-driven approaches such as Artificial Intelligence (AI) has introduced transformative shifts across multiple domains, including preschool education. The integration of AI particularly GPT Vision enables visual data such as children's drawings to be analysed automatically and objectively by detecting patterns, forms, colours, and compositional structures in a systematic manner [2]. This innovation not only enhances the efficiency of assessment processes but also minimizes human bias inherent in visual interpretation, which is often subjective. In the context of art education and early childhood development, the application of AI in drawing analysis remains relatively nascent and underexplored, thus presenting a significant opportunity for innovative research [20].

Recent studies further indicate that data-driven visual interpretation can strengthen the monitoring of children's development across domains such as fine motor skills, spatial awareness, emotional stability, and patterns of non-verbal communication [7]. Consequently, AI as an analytical tool holds strong potential in

supporting formative assessments that are more authentic and holistic within early education, consistent with 21st-century learning aspirations that emphasize visual literacy and technological competence as core pedagogical competencies.

Against this backdrop, the present study seeks to explore the potential of AI integration in analysing preschool children's drawings as indicators of cognitive and emotional development, thereby contributing to the advancement of assessment approaches that are more objective, valid, and comprehensive in early childhood education.

2.0 Background of the Study

In early childhood education, drawing has long been recognized as a vital medium that indirectly reflects cognitive, emotional, and social development. For preschool children in the pre-verbal phase, visual expression serves as a primary mode of communication, enabling them to convey imagination, thoughts, and feelings about their environment [7]. Accordingly, the analysis of children's drawings provides an important window into developmental aspects that may be difficult to capture through conventional tests or verbal methods alone.

However, the evaluation of children's drawings has traditionally relied on subjective interpretations by teachers or experts, making it susceptible to biases and inconsistencies. This limitation underscores the need for alternative approaches that are more objective, systematic, and data-driven. In the digital era, Artificial Intelligence (AI) particularly GPT Vision emerges as a promising solution with the potential to transform the assessment landscape in early childhood education. AI enables a more detailed analysis of visual elements such as lines, colours, shapes, spatial arrangements, and symbols, thereby generating interpretations that are both precise and consistent [20].

Previous studies have further demonstrated that the integration of AI in preschool education can enrich assessment strategies, especially in identifying developmental patterns longitudinally and supporting inclusive as well as holistic learning [2]. Beyond enhancing the accuracy of developmental monitoring, the application of AI in drawing analysis also strengthens teacher training by fostering visual literacy and technological competence as core 21st-century pedagogical skills [16].

Despite these promising insights, empirical studies that specifically apply AI to the analysis of preschool children's drawings remain scarce, particularly within the Southeast Asian context. Most existing research is concentrated in Western or East Asian settings, with limited attention to culturally diverse populations where visual symbolism and interpretive frameworks may differ substantially. This gap highlights the urgency of developing context-sensitive, AI-assisted assessment models that not only address local educational needs but also contribute to the global discourse on technology-enhanced early childhood pedagogy. Against this backdrop, the present study seeks to examine the real potential of AI integration in the analysis of preschool children's drawings as a valid, authentic, and innovative diagnostic approach in early childhood education.

3.0 Literature Review

Research on children's drawings as indicators of psychosocial, cognitive, and emotional development has long been a central focus in early childhood education. Drawings function not only as a means of free expression but also as symbolic forms that reflect children's inner thoughts and subjective experiences [7]. Prior studies demonstrate that children use drawings to reconstruct their realities, with visualizations reflecting developmental stages that vary according to age, lived experiences, and environmental contexts [8]. Yet, the interpretation of drawings has remained largely reliant on manual observations, which are inherently subjective highlighting the need for technological integration to enhance accuracy and reliability in interpretation.

Over the past five years, Artificial Intelligence (AI) technologies, particularly computer vision, have increasingly been explored in early childhood education as analytical tools to automate visual observation. Zhou and Wang [20] argue that AI systems based on machine learning models are capable of detecting and classifying visual elements such as shapes, colours, lines, and spatial narratives in children's drawings with greater consistency and systematic precision. This capacity enables faster, less biased, and more traceable analyses that align with the rigor demanded in contemporary educational research.

Furthermore, the application of AI in early childhood education has been examined in relation to its pedagogical and assessment impacts. Ghosh [2] emphasizes that AI not only enhances the efficiency of developmental assessments but also supports inclusive learning by paying closer attention to non-verbal expressions that are often overlooked in conventional assessment systems. When applied ethically and transparently, AI has the potential to strengthen teachers' reflections on child development and to contribute to more valid and authentic reporting [16].

Several local studies have also begun to investigate visual dimensions within the preschool context. Ismail [7], for example, proposed a drawing-based assessment model that integrates fine motor, emotional, and creative dimensions; however, such approaches remain heavily dependent on conventional observation. Thus,

research that integrates AI into the analysis of children's drawings has the potential to bridge this gap by offering new approaches that empirically combine visual data with developmental theory.

From an educational perspective, the integration of AI into visual analysis necessitates greater technological competence and visual literacy among preschool teachers. Beyond improving assessment practices, AI integration adds significant value to teacher training by introducing data-driven perspectives on children's developmental understanding [11]. This underscores the urgency of systematically exploring how AI can be embedded within the Malaysian early childhood context particularly through drawing analysis as a valid and meaningful alternative assessment tool.

4.0 Purpose of the Study

This study examines the potential of integrating Artificial Intelligence (AI), particularly GPT Vision, in analysing preschool children's drawings as a non-verbal medium that reflects cognitive and emotional development. Within the increasingly demanding ecosystem of early childhood education, where holistic and authentic monitoring of development is prioritized, drawings serve as an essential form of symbolic communication and self-expression. However, assessment practices remain largely dependent on manual observation, which is inherently subjective and limited in analytical capacity. In response, this study seeks to enrich both the scientific discourse and practical applications by investigating the use of AI to develop a new, data-driven, objective, and systematic approach to evaluating visual indicators in children's drawings. At the same time, the study emphasizes the application of Lowenfeld's Artistic Development Theory and the Structured Visual Content Analysis Model as interpretive frameworks to strengthen the understanding of symbolic meaning and developmental expressions manifested through children's visual representations.

5.0 Research Objectives

Based on the stated purpose, this study is designed to achieve the following objectives:

1. To identify the level of children's cognitive development at the pre-schematic and schematic stages according to gender.
2. To identify the level of children's emotional development at the pre-schematic and schematic stages according to gender.
3. To analyse visual symbols that indicate cognitive aspects in children's drawings and interpret their meaning using GPT Vision.
4. To analyse visual symbols that indicate emotional aspects in children's drawings and interpret their meaning using GPT Vision.

6.0 Research Questions

In alignment with the research objectives, the following questions were formulated to guide this study:

1. What is the level of children's cognitive development at the pre-schematic and schematic stages according to gender?
2. What is the level of children's emotional development at the pre-schematic and schematic stages according to gender?
3. What visual symbols reflecting cognitive aspects can be identified in children's drawings, and how can these be interpreted using GPT Vision?
4. What visual symbols reflecting emotional aspects can be identified in children's drawings, and how can these be interpreted using GPT Vision?

7.0 Methodology

7.1 Research Design

This study employed a qualitative, interpretivist approach to uncover the cognitive and emotional dimensions of preschool children's development through visual analysis of their drawings. This design was selected for its suitability in examining symbolic meanings and subjective expressions embedded within non-verbal visual works, in line with the exploratory and holistic nature of the study's objectives. The approach engaged with children's inner expressions through visual hermeneutics, while simultaneously integrating AI-based computer vision to support a more systematic and objective monitoring of developmental progress [17], [20].

Anchored in Viktor Lowenfeld's Artistic Development Theory and the Structured Visual Content Analysis Model, the study mapped visual elements onto developmental frameworks in a more structured and data-informed manner. The analysis was conducted through two parallel pathways: (i) manual observation guided by a visual rubric, and (ii) automated analysis using GPT Vision, which facilitated the recognition of shapes, spatial arrangements, colours, visual narratives, and symbolic structures.

7.2 Research Site and Sample

The study was conducted at the preschool of the Institute of Teacher Education, Technical Education Campus, Bandar Enstek, Nilai, Negeri Sembilan Malaysia. The sample consisted of 13 preschool children aged 5-6 years an age range situated within the pre-schematic stage as defined by Lowenfeld [13], a phase in which children begin to exhibit basic figurative symbolism and the formation of visual narratives. Participants were selected based on specific criteria: (i) being within the age range of 5-6 years, (ii) possessing basic competency in handling drawing tools, and (iii) the ability to actively engage in drawing activities.

7.3 Data Collection Procedures

Primary data were collected through children's drawings on the theme "*My Family*", produced freely within a conducive and unstructured classroom environment. This theme was chosen as it is closely related to the children's daily experiences and capable of eliciting diverse visual representations that reflect both cognitive and emotional development. To enhance reliability, AI-generated interpretations were compared with the researchers' theoretical analysis and subsequently triangulated with the class teacher's insights, given their familiarity with the participants [9], [2].

In addition, supporting data were obtained through unstructured individual interviews conducted with the children during and after the drawing process. These interviews sought to capture the symbolic meanings the children intended to convey, as well as the emotional and cognitive contexts underlying their visual elements. The drawings were then scanned at high resolution and uploaded into the GPT Vision system for automated analysis. The AI outputs covering recognition of lines, forms, shapes, object arrangements, and structural compositions were coded and integrated with the manual observations guided by the structured visual content analysis rubric, alongside the interview data.

7.4 Data Analysis Techniques

Data analysis was conducted visually and thematically, guided by Viktor Lowenfeld's Artistic Development Theory and the Structured Visual Content Analysis Model. Each drawing was examined through core visual developmental elements line, form, colour, space, composition, and narrative symbolism. The procedure began with systematic coding of the present visual elements, followed by thematic categorization of cognitive and emotional dimensions based on the two models.

To strengthen objectivity and improve accuracy in detecting visual elements, GPT Vision was employed as an AI-assisted analytical tool. This technology enabled the identification of consistent visual patterns, including compositional structures and symbolic relationships within the drawings. AI-generated findings were subsequently triangulated with manual and thematic coding by the researchers to ensure coherence in interpretation and to minimize subjective bias [7].

Finally, narrative visual analysis was carried out to uncover the latent meanings and internal expressions of the children as manifested through symbolic representation and spatial organization. The final interpretations were further corroborated through unstructured interviews with the children and their teacher, thereby enhancing contextual understanding of the cognitive and emotional dimensions captured in the drawings. This integrated triangulation approach provided a more in depth, valid, and holistic analysis, consistent with the study's objectives.

8.0 Findings and Discussion

The findings of this study are presented in two key dimensions: (i) the analysis of children's cognitive and emotional developmental stages by gender, and (ii) the interpretation of meaning in children's drawings through cognitive and emotional aspects. This dual layered approach allows for both statistical insights and symbolic interpretations, offering a comprehensive understanding of developmental indicators reflected in preschool children's artwork.

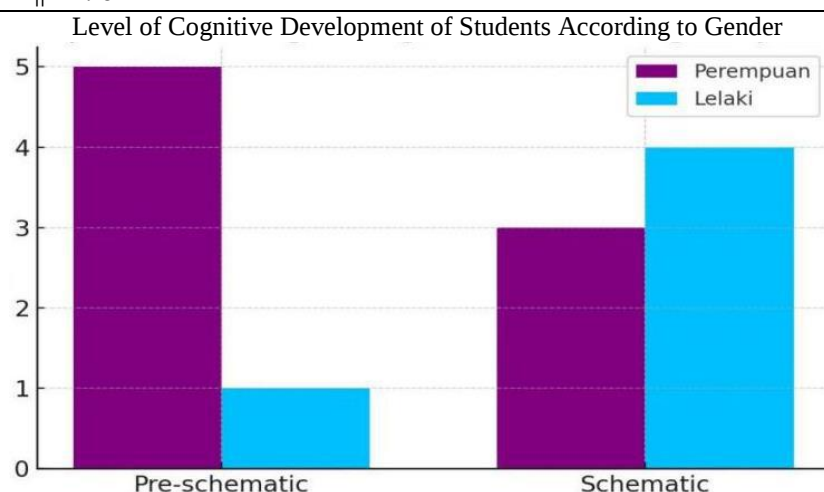


Figure 1: Comparative Analysis of Preschool Children's Cognitive Developmental Stages by Gender

Figure 1 illustrates the comparison of cognitive developmental stages among preschool children by gender. Five (5) female pupils were identified at the pre-schematic stage compared to only one (1) male pupil. Conversely, four (4) male pupils achieved the schematic stage, while only three (3) female pupils reached this level. This pattern indicates that, within the study sample, male pupils were relatively more advanced in terms of visual-cognitive development compared to their female counterparts.

The gender-based variation suggests that environmental factors and the quality of learning stimulation may contribute to differential progress in children's visual cognitive growth. Male participants demonstrated greater complexity in spatial organization such as the inclusion of staircases, layering, and socio-symbolic structures indicating a stronger transition into the schematic stage. In contrast, the majority of female participants continued to display pre-schematic features, including unstable human figures and random spatial arrangements. These findings align with Lim and Omar [12], who emphasize the role of structured art activities as catalysts for cognitive advancement.

Nevertheless, such differences should not be simplistically attributed to biological factors alone. Rahman and Yusof [15] argue that social experiences, family interactions, and pedagogical approaches significantly shape children's visual symbolism. Moreover, the application of AI-assisted analysis in this study [19] enhanced the objectivity of visual pattern identification by reducing gender bias, thereby strengthening the reliability of the findings.

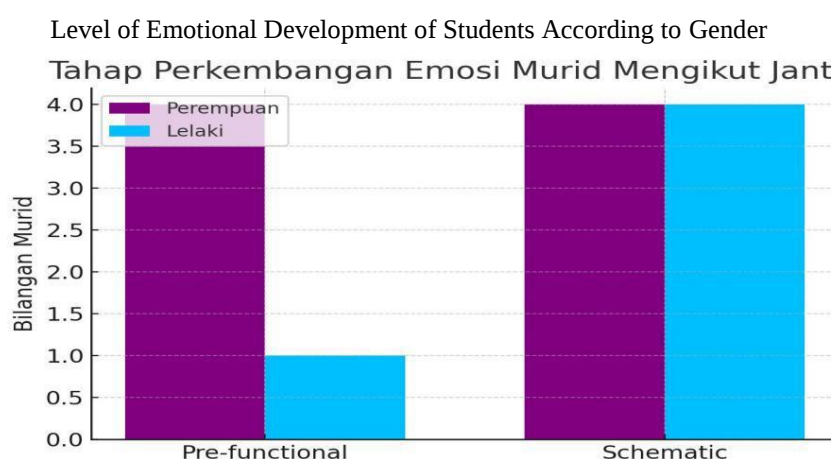


Figure 2: Analysis of Children's Emotional Developmental Stages by Gender

Figure 2 illustrates the comparison of emotional developmental stages between male and female preschool pupils, based on the analysis of 13 drawings with the theme "My Family." Gender-based differences in emotional expression were manifested through visual symbols such as facial expressions, the positioning of figures within space, and the inclusion of supportive elements (e.g., sun, flowers, or vehicles). The analysis was

conducted using a qualitative visual approach grounded in the structured visual content analysis framework and further strengthened through triangulation with teacher and pupil interviews. Indicators such as smiling faces, proximity or distance between figures, symbols of affection, and the presence of complete family members were employed to assess the stability of children's emotional development.

Overall, five (5) female pupils demonstrated stable positive emotional expressions, compared to only two (2) male pupils. Conversely, three (3) male pupils displayed signs of emotional uncertainty or neutrality, in contrast to only one (1) female pupil. This pattern aligns with previous studies reporting that female children tend to express emotions more clearly and structurally in visual art activities, whereas male children are more action or movement-oriented [21]. The findings are also consistent with Denham [11], who highlighted the earlier development of empathy and emotional awareness among girls in early childhood.

These gender-based differences underscore the need for teachers to interpret children's emotional expressions with a flexible, gender-sensitive approach. As argued by Gungor and Vurma [4], visual and symbolic media serve as effective non-verbal channels for accessing the inner emotional world of children, particularly within the context of early education. In this regard, children's drawings should not be viewed merely as artistic products but as critical windows into the emotional well-being of preschool pupils.

Table 1: Cognitive Aspects in Children's Drawings

Pupil's Name	Cognitive Aspect	Cognitive Meaning
Ameera	Multiple spatial levels, complex organization	Demonstrates the ability to plan space and understand levels
Aqil	Overlapping composition, two-level house	Ability to recognize overlapping and multi-layered spaces
Ara	Vertical linear arrangement, minimal use of space	Basic understanding of height and spatial arrangement
Ariana	Unstructured symbols, random space	Limited cognitive structure, lack of stability in space
Arish	Balance of elements, simple space	Balanced and directed visual thinking
Armel	Logical placement, balance of elements	Demonstrates the ability for organization and visual focus
Nayla	Dispersed arrangement of symbols	Early cognition with disorganized arrangement
Nureen	Depiction of high-density images within a capsule	Symbol density reflects concentrated and intense thinking
Raisya	Organized space, recognizable objects	Ability to recognize objects and house structures accurately
Sarah	Arranged stairs and windows	Spatial organization based on logic and function
Aydeen	Apartment structure, layered staircase	Understanding of levels, social arrangement, and spatial structure
Fathimah	Linear and balanced arrangement	Visual balance indicates systematic thinking
Khalish	Closed oval composition, focal positioning	Cognition focused on elements of safety and inner concentration

Cognitive Aspects in Children's Drawings

The cognitive features reflected in children's drawings reveal their levels of visual-spatial development and their conceptual understanding of structure, arrangement, and environmental symbolism. The findings show that several pupils such as Ameera, Aqil, Sarah, and Aydeen demonstrated more complex and layered spatial organization, exemplified through elements such as staircases, overlapping structures, and multi-level arrangements. These features indicate a relatively advanced capacity for logical thinking and visual discrimination at their age [12].

In contrast, drawings produced by pupils such as Ariana and Nayla displayed more random spatial arrangements without stable structural patterns. This suggests either an early stage of visual-spatial development or individual differences related to environmental exposure and contextual experiences. As Wong and Latip [19] argue, the integration of AI software for visual element recognition enhances the objectivity of analysis, particularly in identifying recurring patterns and visual repetitions that signify children's emerging conceptual understanding.

Furthermore, compositions depicting elements such as houses, staircases, and windows highlight children's comprehension of spatial-symbolic relationships, while the placement of family members either inside or outside the home reflects their cognitive capacity to construct visual narratives. Such patterns

underscore the significance of drawing as an indicator of the transition from concrete to abstract thinking in early childhood, as emphasized by Lim and Omar [12].

Table 2: Emotional Aspects in Children's Drawings

Pupil's Name	Emotional Aspect	Emotional Meaning
Ameera	Smiling faces, embraces, positive interactions	Expression of affection and close family relationships
Aqil	Smiling faces, many family members	Joy and comfort in a large group
Ara	Neutral expression, simple arrangement	Controlled emotions and perception of basic relationships
Ariana	Sad face, less structured drawing	Emotional instability, possibly feelings of insecurity
Arish	Smiling faces, holding hands	Togetherness and social intimacy
Armel	Family closeness, shared car	Strong family bonds and emotional support
Nayla	Minimal expression, empty space	Limited expression, possibly neutral or closed-off
Nureen	Dark faces, dense expression	Dense and symbolic emotions, signs of anxiety or stress
Raisya	All family members smiling, orderly	Balance of positive emotions and strong social structure
Sarah	Consistent smiles, stable arrangement	Emotional stability through consistent visual arrangement
Aydeen	Group smiles, layered arrangement	High social awareness, collective emotional expression
Fathimah	Heart symbols, moderate expression	Positive feelings conveyed through symbols of affection
Khalish	Smiles, closed oval house	Emotional security within an enclosed and orderly space

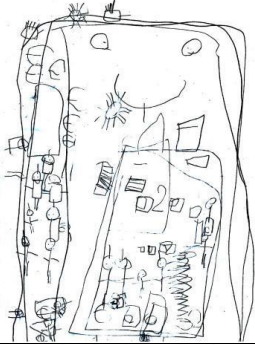
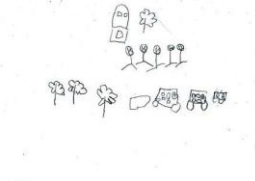
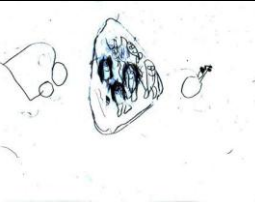
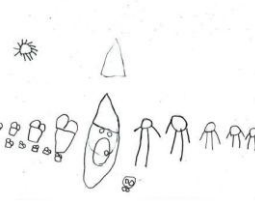
Emotional Aspects in Children's Drawings

The emotional analysis of preschool children's drawings reveals a broad spectrum of affective manifestations including affection, joy, and togetherness while also providing cues of stress or emotional instability. For example, drawings by pupils such as Ameera, Aqil, and Arish illustrated positive emotional expressions through symbols of smiling faces, embraces, and family interactions. These features reflect emotional well being and family environments that foster healthy socio-emotional development [6].

In contrast, drawings by pupils such as Ariana and Nureen displayed denser or less structured compositions, which may indicate anxiety, internal tension, or environmental discomfort. Elements resembling "closed capsules" or "downcast faces" suggested tendencies towards restrained emotions and difficulties in verbalizing feelings echoing the findings of Rahman and Yusof [15], who observed that children often employ visual symbols to articulate internal conflicts.

Additionally, the presence of symbols such as hearts, flowers, or collective family arrangements served as critical markers for understanding children's emotional literacy. Tan and Hassan [18] emphasize that non-verbal media such as drawings provide a more authentic space for self-expression, particularly among children who have not yet developed mature verbal skills. When interpreted within the broader framework of family and social contexts, children's drawings thus hold strong potential as effective diagnostic tools for assessing emotional well-being.

Table 3: Analysis of Children's Drawings at the Pre-Schematic Stage

Pupils (5–6 years)	Drawing	Cognitive Aspect	Emotional Aspect
Ameera		Multiple spatial levels without perspective; the repeated use of squares and circles indicates an early attempt to differentiate between objects and background [12].	Smiling faces, family embraces, and the sun symbol serve as indicators of attachment and a sense of security [15].
Nayla		The dispersed placement of symbols reflects egocentric cognition, where objects are arranged according to personal importance rather than realistic scale [21].	Neutral expressions and family figures separated by empty space suggest possible constraints in conveying social emotions [18].
Nureen		The dense “capsule” composition, with emphasis on the main group of figures, reflects cognitive centralization on the most significant subjects [10].	Dense and dark compositions indicate anxiety or a need for emotional stability, with the absence of cheerful natural symbols [1].
Fathimah		The repeated linear heart symbols suggest a minimal understanding of left-to-right sequencing and relative size concepts [3].	Hearts and the linear arrangement of figures reflect collective affection and the orderliness of positive emotions [5].
Raisya		A stable-sized house and symmetrically arranged natural objects indicate a transition into the early schematic stage in terms of spatial organization [1].	All figures depicted with smiling faces, accompanied by the presence of the sun and clouds, serve as indicators of well-being and optimism [4].

Schematic Stage Drawings: Cognitive and Emotional Trajectories

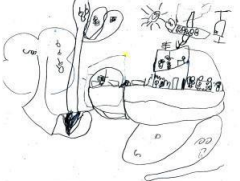
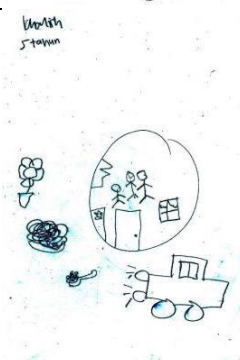
The five drawings classified within the schematic stage illustrate diverse trajectories of cognitive development consistent with Lowenfeld's model. At this phase, children begin to differentiate basic forms, although mastery of perspective and proportional scaling remains limited [12]. Ameera and Raisya demonstrated more systematic spatial organization, signalling an early transition into the schematic stage. In contrast, Nayla and Nureen continued to exhibit egocentric layouts with dense, randomly distributed symbols, reflecting Piaget's concept of centration. Fathimah's repeated use of heart motifs aligns with [3], who argued that simple iconographic patterns reflect an emerging grasp of sequencing, albeit with restricted spatial differentiation.

From an emotional dimension, the presence of smiles, embraces, and cheerful natural elements (sun, clouds, flowers) in Ameera and Raisya's works supports [15] claim that positive visual expressions are strongly associated with nurturing family environments. Conversely, Nureen's emphasis on darker tones and dense compositions revealed underlying anxiety, consistent with [1], who linked compressed spatial arrangements with emotional tension. Meanwhile, Fathimah's linear arrangement of heart symbols suggested affective balance

and strong social bonding, corroborating [5] meta-analysis on the prevalence of affection symbols in children's art.

Taken together, these findings reaffirm the role of children's drawings as powerful non-verbal diagnostic tools that integrate cognitive and emotional indicators. Such insights hold important implications for educators, highlighting the need to design context-sensitive enrichment interventions that address both developmental and socio-emotional dimensions.

Table 4: Analysis of Children's Drawings at the Schematic Stage

Pupils (5–6 years)	Drawing	Cognitive Aspect	Emotional Aspect
Aydeen		The arrangement of the house structure and family figures aligned with the earth sky division demonstrates a basic understanding of spatial perspective [12].	Clear facial expressions and physical proximity between figures illustrate emotional stability and positive affective relationships [1].
Arish		The use of relative size demonstrates an increased level of cognitive discrimination, with primary objects depicted larger than background elements [3].	Smiling faces and the use of bright colours convey emotional balance and attachment to the social environment [21].
Aqil		The use of horizontal baselines and orderly placement of figures reflects spatial mastery and consistency in compositional organization [1].	The presence of sun and rainbow symbols signals emotional well-being and a heightened level of optimism [15].
Khalish		A composition centred on a single house structure and figures, with emphasis on the relationship between primary objects, reflects cognitive focusing skills [10].	Parental figures depicted as large and positioned close to the child symbolize emotional dependence and a sense of security [4].
Sarah		The drawing demonstrates a logical division of upper and lower space, with sky and terrestrial objects positioned consistently [5].	Figures holding hands and smiling expressions represent warmth and encouraging emotional stability [18]

Findings: Schematic Stage Drawings

The drawings produced by Aydeen, Arish, Aqil, Khalish, and Sarah displayed features consistent with Lowenfeld's schematic stage. Cognitively, there was clear evidence of progress in spatial structuring, symbolic arrangement, and the use of scale and perspective between objects. For instance, Aqil and Sarah demonstrated increasing consistency in differentiating the earth-sky boundary, a marker of emergent conceptual organization and representational logic in two-dimensional space, as outlined by Lowenfeld and Brittain [18].

Similarly, the proportional use of human figures relative to other objects in Arish and Aydeen's drawings reflected more advanced visual discrimination and the ability to classify objects based on significance and functional role within the environment [21]. Khalish's drawings incorporated horizontal baselines, symmetrical compositions, and balanced spatial arrangements, corroborating Liang and Wong's [10] findings that schematic stage children often construct visual structures grounded in memory and concrete experiences.

From an emotional perspective, all five drawings highlighted positive affective symbolism linked to psychosocial well being. The presence of the sun, rainbows, and smiling faces in Aqil and Sarah's work signified emotional stability and optimism in family relationships [1]. Collective imagery such as family members holding hands and standing in close proximity illustrated affective attachment and healthy social bonding [4]. In particular, Khalish's portrayal of parents as dominant figures in both size and spatial placement reflects affective dependence and the perception of parental figures as protective anchors, resonating with Bowlby's attachment theory, where young children express reliance on primary caregivers through visual and symbolic representation [18].

9.0 Conclusion

Overall, the analysis revealed that schematic-stage drawings not only signify advances in cognitive capacity but also reflect emotional stability aligned with positive social and familial contexts. These findings strengthen the case for children's drawings as a valid and meaningful alternative assessment medium in early childhood education, consistent with Goh and Latip's [3] assertion that visual expression serves as a window into children's internal development.

This study further substantiates the argument that preschool children's drawings represent an authentic tool for uncovering cognitive and emotional growth symbolically and non verbally. The analysis of 13 drawings themed "*My Family*" revealed significant gender-based variations: male pupils displayed stronger tendencies in visual organization and cognitive structuring (schematic stage), while female pupils demonstrated more stability and depth in emotional expression. These results underscore that development does not unfold uniformly, but emerges through the complex interplay of internal factors (maturation, personality) and external influences (family environment, teacher pedagogy, artistic exposure).

Beyond serving as reflections of children's inner worlds, drawings provide essential insights into spatial planning, symbolic management, and socio affective relationships. By applying Lowenfeld's model alongside a structured visual content analysis framework, this research offered a systematic and reflective means of evaluating developmental trajectories. Accordingly, the study recommends that children's drawings continue to be elevated as a valid, effective, and ethical diagnostic approach in early childhood education particularly for identifying developmental support needs and planning context-sensitive interventions tailored to individual stages and experiences.

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