Fine Motor Development in Early Childhood: A Descriptive Study in Kindergartens

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ABSTRACT
Fine motor development is a fundamental aspect of early childhood education because it is directly related to children's readiness to learn, independence, and ability to perform daily activities. This study aims to describe the fine motor development of 5-6-year-old children in kindergarten through practice-based learning activities, particularly Cooking Class activities. The study used a descriptive quantitative approach with subjects aged 5–6 years at RA Baitul Ibadah, West Binjai District. Data were collected through fine motor development observation sheets covering aspects of strength, coordination, and flexibility of finger movements. Data analysis was performed using descriptive statistics in the form of mean values, achievement percentages, and development categories. The results showed that the children's fine motor development was in the moderate category, with hand-eye coordination indicators showing better achievement than strength and finger flexibility. These findings indicate that learning activities involving direct manipulation of objects, such as cooking classes, have the potential to support children's fine motor stimulation more optimally. This study recommends that early childhood educators integrate contextual practice-based activities as part of their learning strategies to support the fine motor development of young children.

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ABSTRACT
Perkembangan motorik halus merupakan aspek fundamental dalam pendidikan anak usia dini karena berkaitan langsung dengan kesiapan belajar, kemandirian, dan kemampuan anak dalam melakukan aktivitas sehari-hari. Penelitian ini bertujuan untuk mendeskripsikan perkembangan motorik halus anak usia 5–6 tahun di taman kanak-kanak melalui aktivitas pembelajaran berbasis praktik, khususnya kegiatan Cooking Class. Penelitian menggunakan pendekatan kuantitatif deskriptif dengan subjek anak usia 5–6 tahun di RA Baitul Ibadah Kecamatan Binjai Barat. Data dikumpulkan melalui lembar observasi perkembangan motorik halus yang mencakup aspek kekuatan, koordinasi, dan fleksibilitas gerakan jari tangan. Analisis data dilakukan menggunakan statistik deskriptif berupa nilai rata-rata, persentase pencapaian, dan kategori perkembangan. Hasil penelitian menunjukkan bahwa perkembangan motorik halus anak berada pada kategori sedang, dengan indikator koordinasi tangan dan mata menunjukkan capaian lebih baik dibandingkan aspek kekuatan dan fleksibilitas jari. Temuan ini mengindikasikan bahwa aktivitas pembelajaran yang melibatkan manipulasi benda secara langsung, seperti Cooking Class, berpotensi mendukung stimulasi motorik halus anak secara lebih optimal. Penelitian ini merekomendasikan agar pendidik PAUD mengintegrasikan kegiatan berbasis praktik kontekstual sebagai bagian dari strategi pembelajaran untuk mendukung perkembangan motorik halus anak usia dini.

KATA KUNCI
Motorik Halus, Anak Usia Dini, Studi Deskriptif, Taman Kanak-Kanak

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Introduction

Early childhood education is a crucial early stage in the overall human development process. During early childhood, children experience rapid and sensitive growth and development, covering physical-motor, cognitive, language, social-emotional, and moral aspects. Development experts emphasise that early childhood is a golden age, a period when the basic structures and functions of development are significantly formed and become the foundation for children's readiness to learn at the next level of education (Santrock, 2011; Papalia & Martorell, 2015). Each aspect of development interacts with and is inseparable from the others, so that delays in one aspect have the potential to affect other aspects of development.

One aspect of development that plays an important role in the context of early childhood

education is fine motor development. Fine motor skills refer to a child's ability to coordinate small muscles, particularly in the fingers and hands, which are integrated with the visual system to produce movements that require accuracy, control, and precision (Gallahue, Ozmun, & Goodway, 2012). These skills form the basis for various early academic activities, such as writing, drawing, cutting, folding, and self-care activities. Optimal fine motor development enables children to actively participate in learning activities and increases their independence in daily life.

A number of studies show that fine motor skills are closely related to children's cognitive development and academic readiness. Cameron et al. (2012) found that fine motor skills significantly contribute to early literacy and mathematical abilities in young children. Children with good fine motor control tend to be better able to engage in writing activities, focus their attention, and complete learning tasks that require eye-hand coordination. In addition, fine motor development is also related to socio-emotional aspects, particularly in building children's confidence and perseverance when completing tasks (Piek et al., 2008).

Despite its strategic role, fine motor development in early childhood does not always develop optimally in every child. In kindergarten learning practices, there are still children who have difficulty controlling their finger movements, maintaining their grip on writing instruments, or coordinating their hand and eye movements in a stable manner. This condition can result in low participation in learning activities, increased dependence on adult assistance, and frustration when facing early academic tasks. If not identified early, fine motor limitations have the potential to continue and affect children's readiness to face the demands of learning in primary school (Case-Smith, 2013).

Theoretically, fine motor development is influenced by the maturity of the central nervous system, the strength and flexibility of small muscles, and the movement experiences children gain through interaction with their environment. Motor development theory emphasises that motor skills develop gradually through a process of practice, repetition, and meaningful experiences in contexts appropriate to the child's developmental stage (Clark & Metcalfe, 2002). Thus, fine motor development is not only determined by biological factors but is also greatly influenced by the quality of stimulation and opportunities for exploration provided by the family environment and early childhood education settings.

Various studies on the fine motor skills of early childhood generally focus on the influence of certain methods, media, or activities on improving fine motor skills. However, research specifically aimed at describing the level and characteristics of early childhood fine motor development in the context of formal education is still relatively limited. In fact, descriptive studies play an important role in providing an empirical picture of the actual condition of child development as a basis for more targeted evaluation and learning planning (Creswell & Creswell, 2018).

The limited descriptive data on the fine motor development of early childhood has the potential to cause educators to lack clear references in determining stimulation strategies that are appropriate to the abilities and needs of children. Without an accurate understanding of the condition of children's fine motor development, intervention efforts risk being ineffective and lacking context. Therefore, research is needed to provide a comprehensive picture of the fine motor development of early childhood in kindergarten.

Based on this description, this study aims to describe the fine motor development of early childhood in kindergarten, particularly in children aged 5–6 years. This study is expected to provide theoretical contributions in the form of empirical studies on the fine motor development of early childhood, as well as practical contributions for early childhood educators in understanding children's developmental conditions as a basis for planning learning that is in accordance with the characteristics and developmental needs of children.

Method

This study utilised a descriptive approach supported by quantitative data from measurements of fine motor skills in early childhood. The descriptive approach was used to systematically describe the profile of children's fine motor development based on measurement results using developmental

assessment instruments without the provision of special treatment. This design is appropriate for research that aims to map the characteristics of subjects' abilities factually and contextually in the natural setting of early childhood education (Creswell & Creswell, 2018).

The research subjects were children aged 5–6 years enrolled in the kindergarten where the research was conducted. Subject selection used total sampling technique, whereby all children in the target age group were included as research respondents to obtain a comprehensive picture of fine motor development. The research was conducted during the current semester of the active school year with the approval of the school and class teachers.

The instrument used in this study was a fine motor development observation sheet for children, compiled based on fine motor development indicators for children aged 5–6 years. The aspects assessed included finger muscle strength, hand-eye coordination, and finger flexibility and precision. Each indicator was developed into performance criteria that enabled objective and systematic assessment of children's fine motor skills. The instrument was developed with reference to early childhood developmental achievement standards and was used to identify children's fine motor development levels quantitatively.

Data collection procedures were carried out through direct observation of children's fine motor activities in daily learning activities in the classroom. Teachers or researchers observed children's performance while performing activities that involved the use of small hand and finger muscles, such as holding writing instruments, drawing, cutting, folding, and other manipulative activities. Each indicator is assessed using a rating scale according to the criteria set out in the instrument, then recorded on a fine motor development observation sheet.

Data analysis is carried out descriptively and quantitatively by calculating each child's score, average score, achievement percentage, and distribution of fine motor development level categories. The results of the analysis are presented in tables and percentages to provide an overview of the fine motor development profile of children aged 5–6 years. A descriptive analysis approach is used to interpret the patterns of children's fine motor development achievement without conducting inferential hypothesis testing (Creswell & Creswell, 2018).

Result and Discussion

This study aims to describe the fine motor development of children aged 5–6 years based on measurements of 40 children using instruments covering five main aspects of fine motor skills. Measurements were taken in the context of daily learning to provide a factual picture of children's ability to use and control hand and finger movements.

In general, the measurement results showed that children's fine motor skills varied, with the majority of children having achieved development appropriate for their age. This variation in achievement was reflected in both the total scores and the children's performance in each aspect of fine motor skills measured.

The results of the descriptive statistical analysis of children's fine motor skills are presented in Table 1.

Table 1. Descriptive Statistics of Children's Fine Motor Skills (n = 40)

Statistics	Value
Minimum Score	14
Maximum Score	44
Mean	32.15
Median	32.50
Standard Deviation	7.27

The mean value of 32.15 indicates that, in general, children are able to perform various fine motor activities quite well. However, the wide range of scores indicates significant differences in

ability between children, which is a common characteristic in early childhood development.

To understand the condition of fine motor development in a more structured manner, the children's scores were classified into developmental categories as presented in Table 2.

Table 2. Categories of Children's Fine Motor Development

Category	Number of Children	Percentage (%)
Very Good Development	7	17.5
Developing as Expected	17	42.5
Beginning to Develop	15	37.5
Not Yet Developing	1	2.5
Total	40	100

The distribution of these categories shows that most children are in the Developing as Expected category, although there are still a number of children in the Beginning to Develop category, as well as one child who shows a delay in fine motor development.

Description of Results Based on Instrument Points

Based on the results of observations and measurements of fine motor skills in 40 children aged 5–6 years, it was found that most children had demonstrated fairly good ability in using and controlling hand and finger movements in pre-writing activities. In general, children were able to use writing instruments relatively correctly, including picking up and putting away writing instruments in their proper place. Children in the higher development category showed a stable grip with flexible finger positions, allowing them to write and draw more comfortably. However, some children still had a stiff and unstable grip, which affected the accuracy of their movements and comfort when using writing instruments.

There was considerable variation in the children's ability to move writing instruments. Some children are able to draw straight and curved lines with stable pencil pressure, resulting in clear and controlled strokes. This condition reflects well-developed finger and hand muscle control. Conversely, children at a lower level of development still show inconsistent pressure, either too light or too strong, and have difficulty maintaining their grip when writing for longer periods of time. This variation is in line with the findings of the total fine motor skills score, which shows a fairly wide range of achievements, from a low score of 14 to a high score of 44.

In terms of moving their hands in the direction of writing, most children are able to direct their hand movements from left to right in accordance with the writing pattern. Children also begin to show stability in colouring activities, although some children still make movements that go outside the boundaries of the picture. The position of holding the pencil plays an important role in the flexibility of these movements, as children with an incorrect grip tend to exhibit more rigid and less flexible movements when writing and colouring.

The ability to copy letters shows that children in the Developing Very Well and Developing as Expected categories, which together comprise 60% of the research subjects, are able to copy capital and small letters in a form that relatively resembles the examples. Children are also able to imitate colours and shapes according to the teacher's instructions. However, some children still have difficulty maintaining the proportion and consistency of letter shapes, which indicates that their fine motor skills are still in the development stage and require further practice.

The ability to connect dots to form lines or shapes reveals significant differences in ability among children. Children with good fine motor control are able to connect dots neatly and sequentially, while children in the Beginning to Develop category, which includes 37.5% of the study subjects, tend to produce broken lines or lines that do not follow the pattern accurately. This aspect requires eye-hand coordination and a higher level of precision, making it a sensitive indicator of a child's overall fine motor development.

Overall, the description of each indicator reinforces the descriptive statistical findings, which show that the average fine motor score for children is 32.15, with the majority of children falling into the Developing as Expected category. These findings indicate that the fine motor development of 5-6-year-old children has developed in accordance with their age, but there are still individual variations that need to be considered in planning learning and fine motor stimulation in kindergarten.

Discussion

The results of this study show that the fine motor development of children aged 5–6 years is in a transitional phase towards maturity, with most children having achieved abilities appropriate to their stage of development. These findings are consistent with the theory of motor development proposed by Clark and Metcalfe (2002) through the concept of the mountain of motor development, which places late preschool age as the phase of refinement of movement control, particularly in fine motor skills that require precise coordination between the eyes and hands. At this stage, children begin to demonstrate improved movement efficiency, grip stability, and the ability to control pressure and direction of movement more consistently.

The dominance of the Developing as Expected category indicates that most children have achieved an adequate level of neuromotor integration to support pre-writing activities. From the perspective of neuromotor development theory, the maturation of the central nervous system—particularly myelination and connectivity between motor and visual areas—contributes directly to increased control of the small muscles in the fingers and hands. Gallahue, Ozmun, and Goodway (2012) emphasise that at the age of 5–6 years, children are in the refinement stage, which is the stage when the quality of movement becomes smoother, more coordinated, and more efficient. The findings of this study, particularly in terms of the use of writing instruments and copying shapes or letters, reflect the characteristics of this stage of development.

In addition to being reviewed from a biological perspective, fine motor development can also be explained through an ecological perspective on motor development. This perspective views motor skills as the result of a dynamic interaction between the individual, the task, and the environment. Children in the higher development category are thought to gain richer movement experiences through consistent learning activities, play, and stimulation in both school and home environments. Conversely, children with lower fine motor skills are likely to face limitations in the frequency, variety, or quality of motor experiences they obtain.

The proportion of children who are still in the Beginning to Develop category reinforces the view that fine motor development is individual and does not always proceed uniformly. According to dynamic systems theory, motor skills develop through an adaptive process influenced by many factors, including muscle strength, postural stability, motivation, and opportunities to practise. Children who exhibit unstable pencil pressure or a stiff grip can be understood as individuals who are still in the stage of consolidating fine motor control. This condition does not necessarily indicate a delay, but rather reflects a normal variation in developmental trajectories in early childhood.

The existence of children in the Not Yet Developing category, although very limited in number, has important pedagogical implications. Developmental literature emphasises that fine motor skills are closely related to academic readiness, particularly writing skills and learning concentration. Cameron et al. (2012) show that children with low fine motor skills are at risk of experiencing difficulties in participating in paper-and-pencil-based learning activities. Therefore, early identification of children in this category is an important preventive measure to prevent further impacts on children's academic development and self-confidence.

The relatively large variation in scores and standard deviations in this study further emphasises that fine motor development cannot be understood solely through average achievements. The developmental perspective emphasises the importance of an individualised approach in understanding children's abilities. Each child has a unique rhythm and pattern of development, so educators need to design adaptive and differentiated learning. Thus, fine motor stimulation is not only oriented towards achieving final results, but also towards the developmental

process experienced by each child.

Overall, the results of this study reinforce the theory that the fine motor development of early childhood is a gradual process influenced by biological maturity, learning experiences, and environmental context. The empirical findings provide evidence that mapping fine motor development through a descriptive approach has strategic value as a basis for planning learning that is oriented towards children's developmental needs. With a comprehensive understanding of the profile of fine motor development, educators can design more appropriate, meaningful, and sustainable stimulation for early childhood.

Conclussion

Based on the results of the study and discussion, it can be concluded that the fine motor development of children aged 5–6 years in kindergarten is in the adequately developed category, with the majority of children demonstrating abilities appropriate to their stage of development. This is reflected in the average fine motor skills score of 32.15 out of a maximum score of 48, as well as the dominance of the Developing as Expected category in most of the research subjects.

More specifically, children have shown relatively good abilities in using and moving writing instruments, directing hand movements to follow the direction of writing, copying letters, and connecting dots to form shapes. However, the results also show variations in achievement between individuals, particularly in terms of grip stability, writing pressure, and movement accuracy. These variations indicate that children's fine motor development does not occur uniformly but is influenced by differences in neuromotor maturity and learning experiences.

The existence of children in the Starting to Develop and Not Yet Developed categories, although relatively small in number, emphasises the importance of continuous monitoring of fine motor development. Without accurate development mapping, children have the potential to experience difficulties in early academic skills, particularly writing skills, at subsequent levels of education.

Overall, this study confirms that a descriptive approach in mapping the fine motor development of early childhood plays an important role as a basis for educators in understanding the actual condition of children's development. This information can be used as a reference in designing learning activities and fine motor stimulation that are more adaptive, contextual, and in line with children's developmental needs.

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