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The Effect of Finger Painting on the Fine Motor Skills of Children with Down Syndrome at the Sumber Dharma Special Education School

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Abstract

Children with Down syndrome generally experience difficulties with fine motor skills, particularly in active finger use, alternating finger use, and hand-eye coordination. This study aims to analyze the effect of finger painting activities on the fine motor skills of children with Down syndrome at the Sumber Dharma Special Education School. The study employed a Single Subject Research (SSR) experimental method with an A-B-A design consisting of baseline-1 (A1) with 5 sessions, an intervention (B) with 8 sessions, and baseline-2 (A2) with 5 sessions. The research subject was a ninth-grade student with Down syndrome. Data were collected through observation using a 12-item instrument with three indicators of fine motor skills and a 1–4 rating scale. Analysis was conducted visually within and across conditions. The results showed an average fine motor skill score of 59.58% in A1, which increased to 71.35% in B, and stood at 68.52% in A2. The intervention phase showed an upward trend and 87.5% stability. The change from level A1 to B was +4.17%, and the overlap percentage between A1 and B was 12.5%. These results indicate that finger painting activities have a positive effect on fine motor skills, and some of the skills acquired persisted after the intervention ended.

Keywords: finger painting; fine motor skills; Down syndrome; Single Subject Research; special education

1. Introduction

Fine motor skills are one of the key abilities that support a child's academic activities and independence. These skills involve the use of the small muscles in the hands and fingers, which require precision, motor control, and hand-eye coordination. In children with Down syndrome, motor development may proceed more slowly due to associated physical and neurological characteristics. These challenges may be evident in activities that require the use of fingers, precision of movement, and visual-motor coordination.

Preliminary observations at the Sumber Dharma Special Education School indicate that the subject has difficulty actively using their fingers, using their fingers alternately, and coordinating their eyes and hands. Finger movements are still unstable and lack precision, and the subject still requires assistance with activities that demand precision. These conditions highlight the need for learning activities that are concrete, engaging, repetitive, and tailored to the learning characteristics of children with Down syndrome.

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One activity that can be used to provide such stimulation is finger painting. Finger painting involves applying paint directly with the fingers onto a drawing surface. The movements of dipping, pressing, rubbing, scratching, and moving the fingers provide children with opportunities to develop strength, flexibility, motor control, and hand-eye coordination. Utami (2014) explains that finger painting can be used as a means of developing fine motor skills, while Astria, Sulastri, and Magta (2015) emphasize the benefits of this activity in providing sensory experiences while supporting the development of coordination.

Previous research has also demonstrated the relevance of finger painting to fine motor development. Taiyeb (2018), through a study using a single-subject research design, found that finger painting techniques can improve the fine motor skills of children with Down syndrome, including the use of all fingers, the alternating use of fingers, and hand-eye coordination. These findings serve as a key foundation for this study. The novelty of this research lies in the implementation of a finger painting intervention structured in stages based on three target behavior indicators for a student with Down syndrome at SLB Sumber Dharma, which was then analyzed using an A-B-A Single Subject Research (SSR) design to observe changes during the intervention as well as the sustainability of skills after the intervention was discontinued.

Based on these conditions, this study aims to determine the baseline level of fine motor skills, identify changes in these skills following the finger painting activities, and analyze the impact of finger painting activities on the fine motor skills of children with Down syndrome at SLB Sumber Dharma.

2. Method

This study employed a quantitative approach using the Single Subject Research (SSR) experimental method with an A-B-A design. This design consisted of three phases: baseline-1 (A1), intervention (B), and baseline-2 (A2). Phase A1 was used to assess initial ability before the intervention; phase B was used to conduct finger painting activities; and phase A2 was used to determine whether changes in ability persisted after the intervention ended. The use of the A-B-A design allowed for repeated observation of changes in the target behavior in a single subject.

The research subject was a ninth-grade student with Down syndrome at the Sumber Dharma Special Education School. The study was conducted over 18 sessions, consisting of 5 baseline-1 sessions, 8 intervention sessions, and 5 baseline-2 sessions. During the baseline phase, assessments were conducted through tasks and observations of fine motor skills without the provision of any special treatment. During the intervention phase, the subject participated in finger painting activities in stages, with individual guidance and a gradual reduction in assistance. The activities included using one finger, several fingers, all fingers, drawing vertical and horizontal lines, alternating finger use, controlling finger pressure, and filling in areas.

Data were collected through direct observation using an observation sheet consisting of 12 items. The instrument included three indicators: (1) active finger use, (2) alternating finger use, and (3) eye-hand coordination. Each item was rated on a 1–4 scale, so the maximum score

for each session was 48. Scores were then converted to percentages to facilitate comparisons across sessions. The instrument underwent content validation through expert judgment, as described in the thesis.

Data analysis was conducted visually both within and across conditions. Analysis within conditions included condition duration, directional trends, stability trends, data traces, stability levels and ranges, and level changes. Analysis across conditions included changes in directional trends, changes in stability trends, changes in levels, and the percentage of overlap. According to Sunanto, Takeuchi, and Nakata (2005), a low percentage of overlap between the baseline and intervention indicates that most of the intervention data fall outside the initial ability range, thereby supporting the hypothesis of an intervention effect.

3. Results and Discussion

3.1 Result

Results The research results were obtained from 18 observation sessions. The data on fine motor skills for each session are presented in Table 1.

Table 1. Percentage of Fine Motor Skills

Condition	Session	Percentage(%)	Mean Level (%)
A1	1–5	58,33; 58,33; 56,25; 62,50; 62,50	59,58
B	6–13	66,67; 70,28; 62,50; 77,08; 72,92; 68,75; 77,08; 75,00;	71,35
A2	14–18	75,00; 66,67; 65,50; 68,75; 66,67	68,52

In the baseline-1 (A1) phase, the percentages of fine motor skills were 58.33%, 58.33%, 56.25%, 62.50%, and 62.50%, respectively, with a mean level of 59.58%. The data range was 56.25%–62.50%. The difference between the lowest and highest values was relatively small, so the initial condition could be used as a baseline for comparison. The A1 data showed an upward trend with minor fluctuations and was generally stable.

During the intervention phase (B), the percentages of fine motor skills were, in order: 66.67%, 70.83%, 62.50%, 77.08%, 72.92%, 68.75%, 77.08%, and 75.00%. The mean level increased to 71.35%, representing an increase of 11.77 percentage points compared to A1. The increase was evident from the start of the intervention and reached a peak of 77.08% in sessions 9 and 12. Although there were declines in sessions 8, 10, and 11, the overall trend of the data remained upward. The stability of the intervention phase at 87.5% indicates that the data were relatively stable.

In the baseline-2 (A2) phase, after the intervention was discontinued, the percentage of fine motor skills ranged from 65.50% to 75.00%, with a mean level of 68.52%. This value was still higher than the mean level in A1. This indicates that the skills acquired during the intervention did not fully revert to their initial state, despite a downward trend observed in A2.

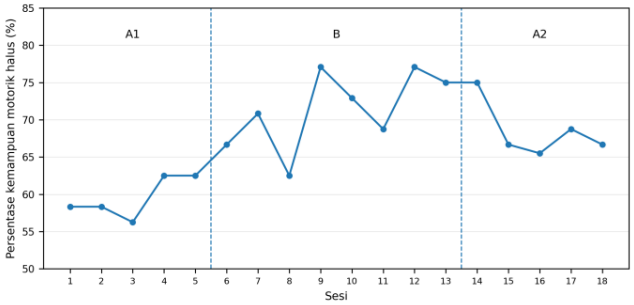


Figure 1. Graph of fine motor skills in phases A1, B, and A2

The cross-condition analysis showed a change in level of +4.17% from A1 to B and 0% from B to A2 at the transition between conditions, based on the end-A1–beginning-B data and the end-B–beginning-A2 data. The percentage overlap between A1 and B was 12.5%. Of the eight data points in the intervention phase, only one remained within the baseline-1 range, while most of the intervention data fell outside the initial ability range. This low overlap reinforces the indication that changes in fine motor skills are related to the implementation of finger painting activities.

3.2 Discussion

The research findings indicate that finger painting activities have a positive effect on the fine motor skills of children with Down syndrome. This is evidenced by an increase in the mean level from 59.58% at baseline-1 to 71.35% during the intervention phase. This change was evident not only in the mean score but also in the upward trend, stable intervention conditions, positive level changes, and a low percentage of overlap. In SSR research, this combination of indicators serves as a crucial basis for assessing changes in target behaviors on an individual basis (Sunanto, Takeuchi, & Nakata, 2005).

During the baseline-1 phase, the subjects' abilities were still in the moderate category and showed relatively little variation. The subjects still had difficulty actively using their fingers, moving their fingers alternately, and directing hand movements in response to visual stimuli. These conditions align with the motor characteristics of children with Down syndrome, who may experience motor developmental delays and require concrete, repetitive, and structured practice. Hallahan, Kauffman, and Pullen (2019) explain that children with Down syndrome may experience hypotonia and motor development delays, making consistent stimulation necessary.

The improvement observed during the intervention phase can be attributed to the nature of finger painting activities, which provide participants with hands-on experiences. By dipping their fingers into paint, pressing, rubbing, scratching, and filling in areas of the picture, participants have the opportunity to move their fingers repeatedly and coordinate their hand movements with their vision. These hands-on activities also make the participants more engaged and active in the learning process. This aligns with Utami (2014), who identifies finger

painting as an activity that supports fine motor skill development through direct use of the fingers.

When examined based on the indicators, active finger use develops through exercises involving moving one finger, several fingers, and eventually all fingers. Alternating finger use is stimulated through activities that require participants to switch from one finger to another according to instructions. Meanwhile, hand-eye coordination is practiced when participants guide their fingers along predetermined lines, patterns, or shapes. These three indicators are interrelated because more controlled finger movements make it easier for participants to guide their hands based on visual cues.

Fluctuations during some intervention sessions did not negate the upward trend. The data dropped from 70.83% to 62.50% in the 8th session, then rose to 77.08% in the 9th session. Subsequent decreases in the 10th and 11th sessions were also followed by increases to 77.08% in the 12th session and 75.00% in the 13th session. This pattern indicates that the subjects' skill development did not proceed linearly across each session. In the context of SSR, behavioral changes must be viewed based on the overall pattern, not just changes at a single data point.

The research results also show that performance remained higher in the baseline-2 phase compared to baseline-1. The mean A2 level of 68.52% was still 8.94 percentage points above the initial condition. This finding indicates the sustainability of performance after the intervention was discontinued. Prahmana (2021) explains that the second baseline phase in single-subject research can be used to assess the sustainability of changes after the treatment is discontinued. Thus, the A2 results indicate that the skills developed during the finger painting practice were still evident even after direct treatment was no longer provided.

The findings of this study are consistent with Taiyeb (2018), who demonstrated that finger painting can improve the fine motor skills of children with Down syndrome, particularly the use of all fingers, the alternating use of fingers, and hand-eye coordination. This similarity is significant because the indicators used in this study also focused on these three skills. Thus, the results provide empirical support that finger painting can serve as an alternative sensorimotor learning activity to stimulate the fine motor skills of children with Down syndrome.

Nevertheless, the study's results must be interpreted in light of the characteristics of a single-subject research (SSR) study, which involves only one participant. Therefore, the findings are more appropriately used to describe changes in the abilities of the participant studied and should not be directly generalized to all children with Down syndrome. Future research could involve more participants, a longer intervention duration, or compare different finger-painting media to strengthen the evidence regarding the effectiveness of this activity.

4. Conclusion

Based on the research results, the subjects' fine motor skills at baseline-1 had a mean level of 59.58% and indicated a relatively stable initial condition. After participating in eight sessions of finger painting, the mean level increased to 71.35%, showing an upward trend and an intervention stability of 87.5%. Cross-condition analysis revealed a positive change of +4.17%

and an A1–B overlap percentage of 12.5%. At baseline-2, the mean level was 68.52% and remained higher than the initial condition. Thus, the finger painting activity had a positive effect on the fine motor skills of children with Down syndrome in the study, particularly in active finger use, alternating finger use, and eye-hand coordination.

Teachers can incorporate finger painting as an alternative fine motor learning activity, implemented in a gradual, structured, and enjoyable manner, and tailored to each student's individual abilities. Schools can support these activities by providing safe and appropriate materials. Future researchers are advised to expand the sample size and develop varied interventions so that research results can be compared across students with different characteristics.

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