Enhancing Fine Motor Skills in Children with Cerebral Palsy through Clay-Based Interventions: Implementing a Task Analysis Approach

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Abstract

Children with cerebral palsy have a main obstacle which is weakness in physical abilities, related to obstacles in muscles and joints either in the hands, feet or other parts of the body. This study aims to explore the effectiveness of clay-based intervention by applying a task analysis approach in improving fine motor skills in cerebral palsy children. Cerebral Palsy (CP) children experience movement disorders caused by impaired brain nerve function, Progressive Dystrophy. Children with disability can be classified into 2 types, namely, orthopedically handicapped children, which is defined as people with disability who experience movement barriers caused by certain deficiencies in muscles, bones, body, and joints. This research includes one subject with spastic cerebral palsy by the age of 14 from SLB Bina Bangsa Surabaya. This research is a descriptive quantitative study that uses a Single Subject Research approach. The research design used in this article is the ABAB research design. The purpose of using this research design is to demonstrate the functional relationship between the intervention and the subject's behavior. The results showed that clay-based intervention with a task analysis approach was effective in improving fine motor skill including coordination between eyes and hands as well as ability to move fingers in children with spastic cerebral palsy. This study makes an important contribution to the field of special education by offering an innovative and effective intervention approach to improve fine motor skills in children with special needs.
Keywords: Cerebral Palsy, Fine motor skills, clay, intervention, task analysis,

INTRODUCTION

Children with physical disabilities face primary challenges related to physical limitations, particularly involving muscle and joint impairments in the hands, feet, or other parts of the body. These challenges impact the development of both gross and fine motor skills, resulting in mobility difficulties (Pitaloka et al., 2022). To address these barriers, various innovative tools have been developed, tailored specifically to the unique characteristics of children with physical disabilities. However, many of these tools require extensive customization, leading to a lengthy ordering process, as they must be carefully designed to meet the specific and detailed needs of each child. This customization process takes considerable time because each child has distinct requirements depending on the severity of their condition.

There are various conditions that fall under the category of physical disabilities, including Cerebral Palsy (CP), movement disorders caused by brain nerve function impairment, Polio, Amputation, and Progressive Muscular Dystrophy. Children with physical disabilities can be classified into two main types: Orthopedically Handicapped, which refers to individuals with movement impairments caused by deficiencies in muscles, bones, or joints.

Cerebral Palsy (CP) is a neurological condition that often affects children's motor development, hindering their ability to perform smooth fine motor movements (Sadowska et al., 2020). Spasticity is the most frequent symptom in children with CP, this is a state where muscle tensions are enhanced which limits the range of passive and active motion in joints

which contributes to developing joint contractures. Enhancing the fine motor skills of children with CP is critical to improving their quality of life, making innovative and effective therapeutic interventions an urgent need.

In clinical practice and research, clay-based interventions have shown significant potential in improving the fine motor skills of children with cerebral palsy. This method provides an engaging and beneficial way for children to explore, experience, and refine their fine motor abilities.

To maximize the effectiveness of clay-based interventions, task analysis has emerged as a foundational approach. Task analysis involves breaking down complex tasks into smaller, manageable steps, allowing children to learn and practice each component systematically. For children with cerebral palsy, this method is particularly beneficial because it simplifies the learning process, reduces frustration, and promotes incremental skill acquisition (Burrows et al., 2022). By applying task analysis to clay-based activities, therapists and educators can create structured, goal-oriented interventions that address the specific fine motor challenges faced by children with CP. For example, a task like "rolling clay into a ball" can be broken down into steps such as (1) grasping the clay, (2) applying even pressure with both hands, and (3) using circular motions to form a sphere. This step-by-step approach not only enhances the child's understanding of the task but also provides repeated opportunities to practice and refine their motor skills..

This article explores the effectiveness of clay-based intervention combined with task analysis method on improving fine motor skills especially hand-eye coordination as well as finger movement capability in children with spastic cerebral palsy. Through a detailed examination of research findings and practical implementation, this study aims to provide valuable insights into how this approach can support the fine motor development of children with CP, ultimately contributing to their functional independence and quality of life.

LITERATURE REVIEW

Definition of Physical Disability

Individual with physical disabilities refers to person with impairment or limitation on physical capabilities which can be caused by accidents, congenital, as well as brain damages. Physical disability also refers to individuals with physical impairments affecting bodily function or structure, often manifesting as incomplete or atypical limb formation. Impairments that were experienced by individuals with physical disabilities are primarily physical and do not necessarily affect their sensory functions. However, these conditions can possibly impact cognitive abilities, communication, behavior, as well as adaptive functioning (Pitaloka et al., 2022).

1. ***Ambulant disabled***

Individuals in this category face limitations in mobility and can move with the help of assistive devices such as crutches, canes, braces, or frames (support devices placed within the body). These individuals do not experience paralysis in their entire body and, therefore, do not require a wheelchair.

2. ***Wheelchair-bound disabled***

This category includes individuals who face severe mobility limitations and require a wheelchair for their daily activities and movement from one place to another.

Cerebral Palsy

American Academy for Cerebral Palsy and Developmental Medicine (AACPDM): Defines cerebral palsy as a group of permanent disorders affecting movement and posture resulting from non-progressive damage to the developing brain. Centers for Disease Control and Prevention (CDC): Describes cerebral palsy as a group of disorders affecting an individual's ability to move, maintain balance, and posture. Clinical features of cerebral palsy encompass a broad range of abnormalities. They are predominantly disorders of movement but also include a spectrum of abnormalities such as poor balance and sensory deficits (Vitrikas et al., 2020).

Fine Motor Skill

Fine motor skills involve movements utilizing specific body parts and performed by small muscles (fine muscles). Examples include writing, coloring, grasping, cutting, drawing, and stacking blocks. Fine motor skills comprise ability in movements that require coordination between different organs. This skill allows individual to coordinate movements between eyes and hands, eyes and feet, as well as the ability to move fingers. This skill also develops slightly later than gross motor as it requires patience and practice to develop (Sutapa et al., 2021). Hence, fine motor skills are movements involving specific body parts and performed by small muscles, such as the fingers and precise wrist movements.

RESEARCH METHOD

This article is a descriptive quantitative study using a Single Subject Research (SSR) approach. SSR, also known as a Single Case Experiment, is a research method designed to modify and document changes in the behavior of an individual or a small group. Unlike traditional experimental research, which involves control and treatment groups, SSR uses the subject as both the control and experimental group (Prahmana, 2021). This method is particularly suitable for studying a single subject and determining the effectiveness of a specific intervention.

The research design employed in this study is the ABAB design. The ABAB design consists of four phases: a baseline phase (A1), an intervention phase (B1), a second baseline phase (A2), and a second intervention phase (B2). This design aims to establish a functional relationship between the intervention and the subject's behavior by systematically introducing and withdrawing the intervention (Yuwono, 2018). The purpose of this design is to demonstrate the functional relationship between the intervention and the subject's behavior

The baseline phase (A1) began with an initial assessment of the student's fine motor skills without any intervention. This phase lasted for two weeks, during which data were collected through structured observation and documentation. The transition to the intervention phase (B1) occurred once the baseline data showed a stable pattern, indicating no significant improvement in fine motor skills. The intervention phase involved the implementation of task analysis using clay, which was carried out for three weeks. After B1, the study returned to a second baseline phase (A2) for two weeks to assess whether the student's fine motor skills regressed in the absence of the intervention. Finally, the second intervention phase (B2) was reintroduced for another three weeks to evaluate the consistency of the intervention's effectiveness.

This study was conducted at SLB Bina Bangsa Surabaya, involving students with cerebral palsy as research subjects. In this study, the research begins with A1, the baseline phase, where the fine motor skills of students are assessed before any intervention is introduced. This is followed by B1, the first intervention phase, during which a task analysis intervention using clay is implemented. After this initial intervention, the study moves into A2, the second baseline phase, to evaluate the students' fine motor skills following the first intervention. Finally, the research proceeds to B2, the second intervention phase, where the task analysis intervention using clay is applied for the second time to observe further progress in the students' fine motor abilities.

The study utilized structured observation and documentation of students' skill data provided by the school. The data were analyzed descriptively using visual analysis. Visual analysis involves techniques such as graphs, charts, and other visual representations to identify patterns, trends, and relationships in the data (Prahmana, 2021). It is used to determine the functional relationship between dependent and independent variables. In this study, the independent variable is the intervention phases (A and B), while the dependent variable is the students' fine motor skill improvement.

RESULT AND DISCUSSION

The "Bina Gerak" program focuses on developing fine motor skills in children through the creation of 3D art using task analysis methods. The criteria for evaluating fine motor skills include the ability to move fingers independently and create art from clay. The evaluation uses a scale of 1 to 4, where a score of 4 indicates that the child requires verbal or non-verbal assistance. The program utilizes materials such as clay, Play-Doh, and Play-Doh kits to help children create art while enhancing their fine motor skills.

Additionally, the program incorporates regular evaluations during each session to assess the effectiveness of the fine motor skill development activities. An initial assessment of the children's fine motor abilities is conducted using the Denver Developmental Screening Test, which evaluates their hand movement skills based on standard developmental milestones. The assessment tools also evaluate the child's ability to perform tasks independently, with verbal or non-verbal assistance, or entirely on their own.

Based on the assessment instrument that were used

to measure fine motor skills capability including eye-hand movement as well as ability to move fingers accurately, subject's fine motor skill are still very low as seen on the Figure 1 A1 graph. As we implement clay-based intervention on the B1 phase, the subject's fine motor skill capability increases consistently. This was proven when the subject was told to write their name during baseline condition when compared to their capability after the first intervention condition. As seen on the graph, the subject's fine motor capability dropped insignificantly during the second baseline phase and went up significantly during the second intervention phase. This highlights the importance of implementing the intervention constantly in order to improve the fine motor skill for spastic cerebral palsy student.

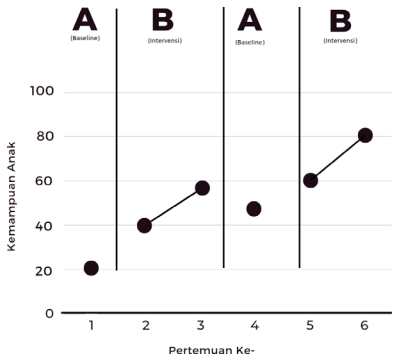

Figure 1. Post-Treatment Student Fine Motor Skill

The findings demonstrate a functional relationship between the task analysis intervention and the improvement in the student's fine motor skills. The ABAB design allowed for a clear comparison between the baseline and intervention phases as it highlights the effectiveness of the intervention. Visual analysis of the data revealed consistent patterns across the phases, with the improvement of fine motor skill during intervention and a slight decline during the withdrawal of the intervention. This supports the hypothesis that the task analysis using clay is an effective method to improve fine motor skills in student especially with spastic cerebral palsy.

Overall, the "Bina Gerak" program aims to enhance the fine motor skills of children with physical disabilities through the use of 3D media. These tools enable children to express themselves independently while also fostering their skill development. The program is designed based on assessments of the children's fine and gross motor skills using the task analysis method. The program steps include warm-up activities, basic modelling techniques with plasticine, shaping objects or animals, and creating art pieces from clay.

The goal of the program is to boost children's creative potential and refine their fine motor skills. The program also incorporates a 1-to-4 evaluation scale and conducts regular re-evaluations in each session to ensure its effectiveness. Documentation is maintained as a follow-up to the program. Consequently, "Bina Gerak" not only enhances fine motor skills but also fosters creativity in children with physical disabilities.

CONCLUSION

Based on the results and discussion, it can be concluded that the implementation of a fine motor skill development program for students with physical disabilities using clay has shown positive outcomes. The subject demonstrated improvement after the intervention, as evidenced by their ability to create art pieces using clay. This improvement in fine motor skills was observed following six sessions of intervention.

RECOMMENDATIONS

For teachers, it is recommended to implement follow-up programs to further develop the fine motor skills of students with physical disabilities using different media and methods. The program should ideally be conducted at least twice a week to optimize and maximize the students' fine motor skills. Additionally, this effort can be extended to the home environment, where teachers collaborate with parents to continue the program with the child at home.

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