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Development of a Handbook to Improve Motor Coordination Among Students with Cerebral Palsy Type of Spastic Diplegia

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***Abstract*—The study aims to develop a handbook to improve the motor coordination of the learners of cerebral palsy type of spastic diplegia at YPAC (a Foundation for Children with Disabilities) in Surakarta, Indonesia. This study implemented 4-D development model from Thiagarajan which is define, design, develop, as for disseminate not applied. Further, the subject of research includes the learners of cerebral palsy with the type of spastic diplegia. The research instruments used were expert validation questionnaire, parent poll, teacher poll, and observation sheet. Data on small-scale trials were analyzed using the gain score test. Product eligibility based on the expert validation test showed the value of 81% and 89% feasibility percentage and a learning design expert showed the value of the qualification percentage of 83%. As for the test of the gain score in the individual trials showed <g> ⩾ 0.7 which means that the outcome of learning of students with cerebral palsy with the type of spastic diplegia based on the criteria of the gain score is on the medium criteria. It can be concluded, the handbook to improve the motor coordination of the learners with cerebral palsy with the type of spastic diplegia is worthy of use as a learning material for the students with cerebral palsy with the type of spastic diplegia with Good category.**

Keywords—handbook; motor coordination; cerebral palsy; spastic diplegia

I. INTRODUCTION

In recent years; the number of children with special needs in Indonesia is increasing. Children with special needs can be interpreted with children who have barriers that require different special services than other children. According to WHO (World Health Organization) calculation; 10% of all Indonesians (24 million residents) experience special needs (ILO; 2014). Further data from PUSDATIN Ministry of Social Affairs of the Republic of Indonesia; reveals 3;010;830 children with special needs experience physical barriers; including the child of cerebral palsy (ILO; 2014).

Cerebral palsy is not a single disease but a name that is given on various kinds of static neuromotor disorder syndrome that occurs due to lesions of the developing brain. The damage to the brain is permanent and cannot be cured; although consequent can be minimised. Progressive musculoskeletal pathology occurs in most affected children. Cerebral palsy Motor disorders are also accompanied by impaired sensations of sensation; perception; cognitive; communication; and behaviour by the epilepsy of secondary musculoskeletal problems [1].

Further cerebral palsy is also indicated from impaired developmental movements and posture; which leads to limited activity. So it can be known that cerebral palsy results in the developmental process; although the growth process and developmental process coincide. The developmental process is the result of maturity in the central nervous system along with various organs that are influenced; such as developments in the neuromuscular systems; development of speech ability; development in emotions; and ability Socialize. Further; all of these functions play an essential role in shaping human life intact [2]. The spastic-type cerebral palsy also experience this condition.

Spastic can be interpreted with stiffness; and convulsions; further spastic children have stiffness in part or whole of muscles [3]. It will have an impact on the mobilisation function and to contradict when the joints bent [4]. As for child with cerebral palsy spastic type is divided into four types of spastic paraplegia; include spastic hemiplegia; spastic diplegia; spastic quadriplegia and [3]. The spastic condition implicates the learning process; due to limited mobility; as a result of motor skills that are not yet able to evolve optimally.

Motor development is a dynamic development; where the child actively develops the skills to achieve the objectives under the boundaries prepared by the child's body and the Environment [5]. Motor skills are divided into crude motor skills as well as fine motor skills. Coarse motor skills are skills that include activities in large muscles; such as moving arms and walking; as well as fine motor skills consisting of finely arranged movements; such as grasping toys; and Shirt [5].

The less moving life pattern is the biggest threat for every person for those who experience special needs; less

moving habits that result from special needs will be the obstacle at once can raise the risk in lowering the capacity of autonomy of a person experiencing special needs. The decrease in physical activity will cause a profound impact if it is not immediately given a special treatment [6].

The students of cerebral palsy experience limited mobility and do not move muscles in a prolonged period causing heavier motor complications such as muscle shortening; decreased muscle function; joint disorders resulting in disruption of daily activities. Given the impact of such conditions; it takes an educational program in the form of activities; developments; and exercises to prevent complications by building the movement in daily activities.

Individual delays on the aspect of motor development certainly require an exercise or coaching. The construction that is done is through the motion service. This service on medical aspects is part of medical rehabilitation; physiotherapy. Further material; method and model evaluation are also based on physiotherapy study areas. The development services in the setting of special schools or SLB can be given by special education teachers who have knowledge and skills on the management of the movement. It is necessary because children are experiencing impaired mobility.

Bodybuilding is an educational effort in the form of activities; development; and training in developing knowledge; skills; values and attitudes for children who experience motor disorders to nurture their movements in conducting life activities. Further movement is also a series of coaching and training activities conducted in a planned and programmatic environment against individuals who have impaired muscle; joints; and bones so that the individual experiences disruption in activity Mobilisation [7].

Based on the concept of the above motion; the cerebral Palsy students need a series of coaching and training activities conducted in a planned and programmatic using Neuro-Developmental Treatment and Perceptual Motor Learning.

Neuro-Developmental Treatment (NDT) or better known as Bobath aims to handle disorders of the central nervous system for both infants and children. The handling should begin early to achieve the optimum result[8]. Further related to Perceptual Motor Learning (PML); one of the essential factors in the child's growing process is the ability of Perceptual motor; which develops at an early age just like other aspects of human development. This PML include static motion exercises and dynamic balance; body awareness; form understanding; determination and auditory and visual sequences; auditory and visual perception; eye and hand coordination and spatial understanding [9].

The number of cerebral palsy children recorded in YPAC Surakarta is mainly with the condition of cerebral palsy spastic. The students of cerebral palsy under the care of YPAC Surakarta get one type of program in each motion service session; which is the program Neuro-Developmental Treatment (NDT) or Bobath to help the development of children. The result of the use of one program is still not optimal because each program includes different steps.

Previous research on Neuro Development Treatment (NDT) was conducted by Awaliah (2016); which examines the influence of combination massage and Neuro Development treatment (NDT) on postural ability to sit on some cerebral palsy children Spastic type. The results showed that the combined influence of Massage and Neuro Development Treatment (NDT) on postural ability to sit on some spastic-type cerebral palsy children.

[10] in its findings; shows the effect of applying tactile stimulation masgutofa neuro sensory-motor reflex integration as well as perceptual-motor learning towards the child's motor ability with developmental coordination disorder. The application of tactile stimulation masgutofa neurosensorimotor reflex integration as well as perceptual-motor learning in children who are experiencing the condition developmental coordination disorder have an impact on the motor advancement of children.

The results showed that bodybuilding should be carried out regularly and controlled by anyone who performs. If there is no handbook; then the results will not be maximal; including in the activities of bodybuilding services other than teachers also parents who are responsible for the family relationship. In reality; parents do not have a reference in bodybuilding activities.

Further; there are not yet available motion development handbook that are systematically arranged for cerebral palsy learners. [11] reveals the need for a handbook for parents; as many parents do not understand the step of addressing his child who is experiencing cerebral palsy. As for [12] reveals the importance of a complete handbook to treating cerebral palsy children. In this study need guidance for teachers as a step of application of learning.

As per the exposure described in the background above; the formulation of the problems examined in this study is.

- How to develop a handbook to improve the motor coordination of the learners cerebral palsy spastic type diplegia?
- How is the feasibility of a handbook to improving the motor coordination of the learners cerebral palsy spastic type diplegia?

II. METHOD

This research applied Research and Development (R&D) model. Further research and development (R&D) is defined as the research applied in order to create/compile a product and then followed by conducting the feasibility testing of the product. As for this research resulted in the development of a handbook to improve motor coordination of learners with cerebral palsy type of spastic diplegia.

Associated with data collection techniques; researchers used questionnaires and observations. Further data were analyzed using gain score.

III. Result and Discussion

A. Result of the development of handbook to improve motor coordination of students with cerebral palsy type of spastic diplegia

Results or products in this research in the form of a handbook to improving motor coordination of learners with cerebral palsy type of spastic diplegia. The development of a handbook can be examined in two main aspects; namely physical aspects and aspects of content.

- Physical aspects
  The physical aspect of the handbook to improving the motor coordination of students with cerebral palsy type of spastic diplegia can be examined based on two things; namely typography and the format of the handbook.
- Content aspects
  The content aspect of the handbook to improve the motor coordination of the students with cerebral palsy type of spastic diplegia divided into two namely: the contents of the cover and the contents of each component contained in the teaching book.

B. The feasibility of the handbook to improve motor coordination of learners with cerebral palsy type of spastic diplegia

The feasibility of a handbook to improving motor coordination of the learners with cerebral palsy with spastic diplegia based on the results of experts' validation. The components validated in the material validation in this handbookbook are divided into several components: the content of the material; the aspect of the linguistic; and the aspect of the presentation. The design validation is implemented by a learning design expert; with validated aspects including; Book size; design on the book skin; as well as the layout of the contents. Product eligibility based on the expert validation test results consisting of two material specialists showing the value of 81% and 89% feasibility percentage and a learning design expert showing the value of the qualification percentage of 83%.

C. Feasibility of a handbookbook to improve motor coordination of learners with cerebral palsy type of spastic diplegia

In general; the validator responds very well to this development research. Further validators reveal that the handbook for Cerebral palsy students is still limited. This handbook is a combination program of Neuro Development Treatment (NDT) or Bobath which is a technique developed by Karel and Bertha Bobath in 1996 and Perceptual Motor Learning (PML); a form of exercise Perception-motors that can improve the child's ability in the area of education and exercise (affecting cognitive; affective and psychomotor).

Based on the results of the counting; an expert one who was an expert of special education was granted a feasibility percentage of 81%; with aspects of content; linguistic; and presentation get a score of 4 on 14 items; and a score of 5 on 1 item. As for the suggestion; the input is related to the addition of the concept of cerebral palsy and changes in image size.

Expert two who was a practitioner in motor development for the cerebral palsy students obtained a qualification percentage of 89%; with aspects of content; linguistic; and presentation get a score of 4 on 7 items; and a score of 5 on 8 items. Furthermore; the material expert II also gave a positive appreciation to this handbook because it is very beneficial not only for teachers but also for therapists and parents. Where their role is indispensable to ensure the success of the program given to cerebral palsy learners; it is consistent with the opinion of Taylor [15]; which reveals the importance of the involvement of all parties in providing service for cerebral palsy learners.

More specifically in terms of material; the handbook for improving the motor coordination of the learners of cerebral palsy with the type of spastic diplegia is good enough in the content aspect; as it includes a detailed motor development program. It is in line with the opinion of Decaprio [16] which reveals that motor learning is an effort to learn movement skills and the smoothing of motor skills; and variables that support or inhibit skills and abilities motor. Where motor disorders; both in rough motor and fine motor aspects are one of the characteristics of the students of cerebral palsy [14] due to damage especially in the pyramidal tract and extrapyramidal parts that have the function to RegSSssulate a motor system.

D. Discussion

The results of the development of this study is a handbook to improve the motor coordination of the learners with cerebral palsy type of spastic diplegia. This research resulted in a book that has been through the development process using the Thiagarajan Model [13] was implemented in accordance with the development procedure.

Products of handbook to improve motor coordination of the learners with cerebral palsy type of spastic diplegia is packaged according to the development procedure of [13] ranging from definition to development. In the handbook; the detailed and structured motion-building steps for cerebral palsy learners. This is in accordance with the opinion of the Assjari (2010) [7]; which reveals that the movement is a series of coaching activities and exercises undertaken by professional teachers in the field of special education; in a planned and programmatic manner in Individuals who experience disturbances in both the muscles; joints; and or bones; thereby happens during mobilization. Further; the handbookbook to improve the motor coordination of the learners of cerebral palsy spastic type This diplegia also includes the development of knowledge; skills and attitudes holistically. It is in line with the opinion of [14] Expressing motion is all the effort done to change; improve; and form a motion pattern that approaches standard motion patterns for children experiencing disruptions to aspects of a motor to foster its movement in conducting its daily activities.

IV. Conclusion

This research has resulted in the form of handbook to improve motor coordination of learners with cerebral palsy type of spastic diplegia. The handbook has a dimension of 15 x 25 cm with a book thickness of approximately 51 pages.

Product feasibility of handbook to improve motor coordination of learners with cerebral palsy w type of spastic diplegia is acceptable. This can be seen based on the results of expert validation test consisting of two material experts who show the value of feasibility percentage of 81% and 89% and a learning design expert who showed a 83% feasibility percentage. Each of these assessments showed that the handbook for improving the motor coordination of the learners with a cerebral palsy type of spastic diplegia is worthy of use as a learning material for the students with the cerebral palsy type of spastic diplegia.

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