

OPTIMALISASI INDERA PERABA DAN PENDENGARAN DALAM PENGUASAAN *ONE-HANDED OVERARM THROW* ANAK DENGAN GANGGUAN PENGLIHATAN

OPTIMIZATION OF THE SENSES IN ONE-HANDED OVERARM THROW CHILDREN WITH VISION Impairments

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ABSTRAK

Anak tunanetra memiliki performa aktivitas fisik harian yang lebih rendah dibandingkan dengan sebaya mereka yang memiliki penglihatan, termasuk olahraga. Anak dengan gangguan penglihatan memiliki gerakan motorik yang tidak ideal karena indera penglihatan penting untuk keakuratan gerakan secara optimal. Faktor yang mempengaruhi derajat tidak idealnya gerakan adalah tingkat gangguan penglihatan, status kelahiran (cukup bulan atau prematur) dan latar belakang pengetahuan tentang kemampuan atau konsep gerakan. Penguasaan keterampilan motorik yang memadai, terutama keterampilan lokomotor dan motorik kasar, berkaitan dengan peningkatan tingkat aktivitas fisik selama prasekolah, anak, dan remaja. Penelitian ini dilakukan di SLB A YPAB Surabaya di mana dalam mengajarkan gerakan melempar, guru hanya memberikan instruksi secara lisan dan sesekali mengarahkan tangan ke arah bola untuk mengambil bola, namun tidak untuk menuntun anak melakukan gerakan tersebut. Hal ini kemungkinan disebabkan karena tidak adanya tenaga pendidik pelajaran kesehatan jasmani sehingga kurang memiliki pengetahuan tentang gerakan tersebut. Penelitian ini bertujuan untuk mengeksplorasi keefektifitasan 2 metode pelatihan, yaitu pelatihan menggunakan indera pendengaran saja dan menggunakan indera pendengaran dan peraba pada tingkat penguasaan gerakan *one-handed overarm throw* serta respon psikologis subjek yang nantinya dapat digunakan sebagai bahan dasar pertimbangan penyusunan metode pengajaran gerakan pada siswa sekolah dasar dengan gangguan penglihatan. Pada penelitian ini ditemukan adanya tingkat penguasaan yang lebih baik pada siswa yang diberikan pelatihan menggunakan indera pendengaran dan peraba dibandingkan dengan pendengaran saja. Secara psikologis, siswa dengan pelatihan menggunakan indera peraba dan pendengaran menunjukkan respon yang lebih positif.

Kata Kunci: siswa; gangguan penglihatan; penguasaan gerakan

ABSTRACT

Blind children have lower daily physical activity performance than their normal peers, including sports, because the sense of sight is important for optimal movement accuracy. Factors that influence the degree of non-ideal movement are the level of visual impairment, birth status and

background knowledge about the concept of movement. Adequate proficiency of motor skills, particularly locomotor and gross motor skills, is associated with increased levels of physical activity. This research was conducted at SLB A YPAB Surabaya where in teaching the throwing motion, the teachers only gave verbal instructions without guiding the child to make the movement. This is probably due to the absence of physical education teacher so they lack knowledge about the movement. This study aims to explore the effectiveness of 2 training methods, using the sense of hearing only and using the senses of hearing and touch as well as the psychological response of the subject which can later be used as a basis for movement teaching methods to elementary school students with visual impairment. In this study, a better level of mastery and more positive psychology response were found in student who was given training using the senses of hearing and touch compared to hearing alone.

Keywords: *student; visual impairment; movement proficiency*

Introduction

Blind children have lower daily physical activity performance compared to their normal peers (Haibach et al., 2014) including in sports. This is due to little to none background knowledge about movement skills or concepts (Lieberman et al., 2014). Adequate motor skills proficiency, particularly locomotor and gross motor skills, is associated with increased levels of physical activity during preschool, childhood, and adolescence and affects enjoyment of physical activity and performance of motor skills as well (Loprinzi et al., 2015).

Several studies were conducted to examine the effect of hearing and touch exercises on spatial abilities related to the accuracy of body movements. In a study comparing the effect of audio-motor training on the spatial abilities of normal and visually impaired people, it was shown that the accuracy of spatial perception increased after receiving audio-motor training. (Cuppone et al., 2019). Subsequent research compared the accuracy of lower body movements between three groups, namely the group that was only given instructions without feedback, was given instructions and feedback and was only given sound cues. From the three groups, there was an increase in accuracy in the group that was given instructions along with audio feedback (Aggius-Vella et al., 2017).

Another study used Audio Bracelet for Blind Interaction (ABBI) to assess movement by relying on the sense of hearing in children with visual impairments. Improved mobility and spatial abilities were found (Finocchietti et al., 2015). A study from 2018 regarding the influence of the auditory organ on the mastery of Fundamental Movement Skills (FMS) movements, including overarm throws, using verbal guidance on children aged 3-5 years, boys and girls by analyzing 5 throwing movements. The results of this study are training using verbal guidance and a motivating learning climate, increasing movement proficiency is more visible (Johnson et al., 2018). Comparison between feedback from the senses of sight and touch related to imaginary motor in 10 normal adults shows the superiority of feedback from the sense of touch compared to the sense of sight in imaginary motor formation (Darvishi et al., 2017).

All the studies above show the ability of the senses of hearing and touch concerning motor movements of the body. However, all these studies were not in the context of studying a complex

movement such as movement in sports and did not consider it from the subject's point of view. The time allocated to the above studies varied and some studies use subjects who are not experiencing congenital total blindness. The psychological condition of the subject is also not considered. Psychological conditions, both positive and negative emotions, affect learning outcomes (Tyng et al., 2017). In this research, the movement studied related to sport. Subjects' point of view and psychological condition were taken into consideration. In addition, the subjects of this research were experiencing congenital total blindness.

The method of teaching movement at SLB A YPAB Surabaya uses verbal instructions and occasionally directs the hand towards the ball to retrieve the ball but does not guide the child to do the movement. This is probably due to the absence of physical education teacher so they lack knowledge about the movement and is considered insufficient because the students cannot imitate the movement. These issues raised the need to develop a more suitable teaching method. This study aims to explore the effectiveness of 2 FMS training methods, using the sense of hearing only and using the senses of hearing and touch, at the level of mastery of the one-handed overarm throw movement as well as the subject's psychological response which can later be used as a basis for movement teaching methods to elementary students with visual impairments. Qualitative descriptive research with a case study design was chosen because this approach and type of research were considered capable of representing the effects of training and psychological responses from the subject's point of view.

Method

This research is a descriptive study using qualitative methods. This method was chosen because this method is used to understand and explore the meaning of a problem from the point of view of the individual or group being studied and provides flexibility for adjustments (Creswell & Creswell, 2018). Case study design was chosen because it allows the researcher to focus in-depth and gain a holistic and real perspective (Yin, 2018). This research was conducted in SLB A YPAB Surabaya. The school environment is considered to represent the natural conditions of the teaching and learning process because behavior is influenced by the environmental conditions where interactions occur (Marshall & Rossman, 2016). Purposive sampling is used in this study to produce appropriate and useful information as well to effectively identify and select limited resources (Campbell et al., 2020). There are several criteria in this study. First is elementary student because in this phase, potential gross motoric growing rapidly (Burhaein, 2017). Second is boy because boys have better motoric movement than girls (Zheng et al., 2022). The last is experiencing congenital total visual impairment. Congenital total visual impairment was selected to eliminate the background knowledge of movement factors. By these criteria, there are 2 samples that fit.

In carrying out the throwing motion, the tennis ball is chosen with consideration of its size and weight which is relatively light enough for training. To record throwing movements during the pretest and posttest, a camera was used. The results of the recording will be analyzed using the Kinovea software. To record the results of interviews, this study uses a mobile phone device which will then be analyzed using the QDA Miner Lite software. Another data source used is number of

cycles, namely the number of movements a subject makes from the preparation phase to throwing in 1 meeting.

This study uses Command Style-A Technique, which is a one-way teaching technique in which the researcher and mentor are the givers of instructions and decisions regarding the material, technique, and results of the training, while the subject is only the recipient. While organizing the subject, training area, and time, this study uses the single station-single task (S.S/S.T) option (Mosston & Ashworth, 2008). This research was conducted within 1 hour per session and 8 meetings, from September to November. This is considered sufficient to be able to perform a movement with a minimum standard performance without any extra effort because it only takes less than 50 hours of practice (Ericsson et al., 2018). Meanwhile, for stronger memory retention, it takes 1 hour or more (Guyton and Hall J. E, 2012). Figure 1 shows the plan used for the pretest and posttest. Camera 1 is placed on the throwing area to take videos of throwing movements from the throwing area, camera 2 is placed opposite the throwing area to record movements from the opposite side (in this study the left) when throwing, while camera 3 is placed in front of the subject to record throwing movements from the front. This camera position is used both during the pretest and posttest. Each subject will be given 3 throws at the *pretest* and *posttest*.

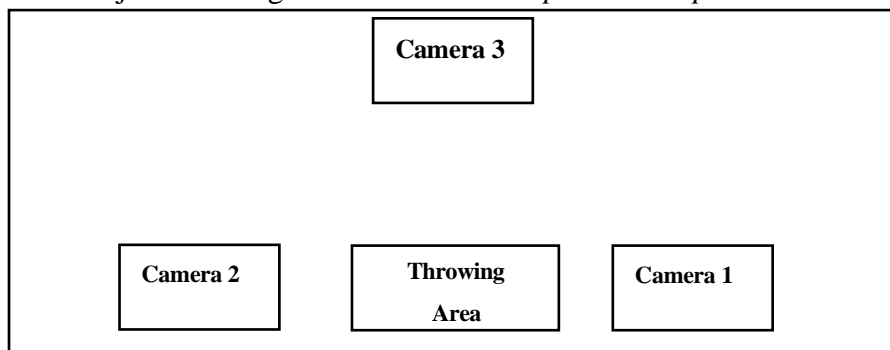


Figure 1. Pretest dan Posttest Plan

Figure 2 is a movement training plan. Each post is filled with 1 subject, 1 instructor and 1 demonstrator. Post 1 is a training post with verbal instructions only. This verbal instruction relates the movements of each body part according to the phases of the one-handed overarm throw. While Post 2 is a training post with verbal and tactile instructions. In touch, the subject will be directed to feel the body parts and their movements in each phase of the movement in a one-handed overarm

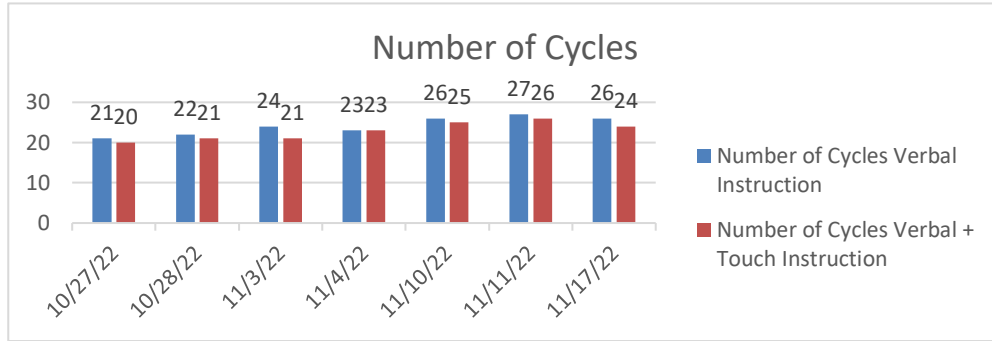


Figure 2. Movement Training Plan

throw. The interview was conducted at the eighth meeting or during the posttest to get a psychological response from the subject.

Result

Based on the 7 sessions that have been conducted, the difference in the number of cycles between the two types of training was obtained as shown in graph 1.



Graph 1. Number of Cycles Between The Two Methods

Based on the data and calculations above, training using only verbal instructions has a greater average than verbal instructions and touch. In training with verbal instructions only, the instructor only gives verbal instructions without or very little directing the subject's body movements as shown in Figure 3, so that they can start the throwing cycle earlier.



Figure 3. Verbal Instruction Method Training Techniques

Unlike verbal and touch instructions where the instructor must give verbal instructions and guide the subject's hand to feel the body parts related to each phase of the movement so that it is slower to start the throwing cycle as shown in Figure 4. This difference causes the number of



Figure 4. Verbal and Touch Instruction Method Training Techniques

cycles each meeting and the average number of cycles during training in the training method with verbal instructions alone was more than the verbal instruction and tactile method as shown in graph 1.

Based on the video analysis of the movements of both types of training, the movements of the subjects trained by verbal instructions and tactile training were more accurate and showed significant changes. The following is a comparison of throwing movements during the pretest and posttest of the two types of training. Based on Figure 5, Subject A internal rotated the radiocarpal joint, this can reduce throwing power so that the throwing distance is not large because the function of the joint is to put back wrist to its neutral position from hyperextension before the release of the ball (deceleration phase) (Mayes et al., 2022). When viewed from the opposite of the throwing side, the internal rotation of the radiocarpal joint causes the ball to slide toward the ground. From the throwing side, Subject A pulled the thrower’s hand away so that follow-through did not occur which would also reduce the ball's throw which reduced the throwing distance. Without follow-through, the load that should be removed will accumulate in the shoulder joint which can increase the risk of shoulder injury (Mayes et al., 2022).



Figure 5. Subject A's Pretest Throwing Movement Analysis)

After training with verbal instructions only, there was an improvement in throwing motion compared to the pretest, but internal rotation movements at the radiocarpal joint and pulling the thrower arm during follow-through are still performed. This is due to Subject A did not understand the instructions given and the instructor unable to find a more common word equivalent, thereby



Figure 6. Posttest Analysis of Subject A's Throwing Movement

reducing the perfection of mastering this motion. Internal rotation movements of the radiocarpal joint and pulling movements of the arm during follow-through were more pronounced from the front and the opposite of the throwing side.

Internal rotation movement at the radiocarpal joints was not found in Subject B, however, Subject B also performed pulling movements during the follow-through during the pretest. The throwing distance in Subject B is farther than Subject A, this is due to the absence of internal rotational movement in the radiocarpal joint so that the wrist back to its neutral position from hyperextension position in deceleration phase but still the throwing distance is still not optimal due to the pulling movement of the throwing arm during follow-through and this also increases the risk of shoulder injuries.



Figure 7. Pretest Analysis of Subject B's Throwing Movement

The following is a video analysis of the throwing movement during the posttest conducted by Subject B. At the time of the posttest, Subject B no longer carried out the pulling movement during the follow-through. This had an impact on increasing the throwing distance.



Figure 8. Posttest Analysis of Subject B's Throwing Movement

The results of interviews with both subjects were analyzed using the QDA Miner software. In this study, the interview transcripts will be grouped with a coding system and grouped into categories. The following is the result of coding the interview transcripts of the two subjects. The categories used in this research are “Ease in Understanding the Material” and “Psychological Response”. In the category of Ease of Understanding the Materials, three codes were obtained, namely “Ease of Movement”, “Ease of Instruction” and “Comparison with the Teacher’s Way”. While the “Psychological Response” category has three codes, namely “Feeling During Training”, “Increasing the Pleasure of Exercising” and “Compatibility With This Method”.

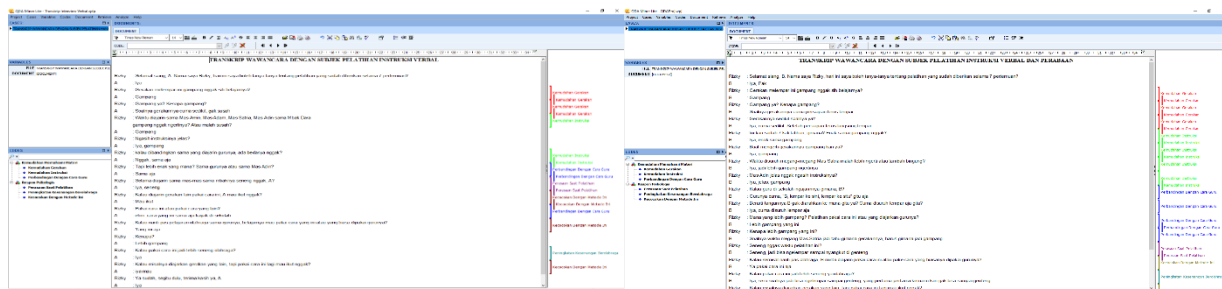


Figure 9. Analysis of Interview Results

Based on the analysis of interviews with subject A who received movement training using only verbal instructions, in terms of the ease of movement being trained, namely the one-handed overarm throw, it is considered easy because it has a small number of movement sequences and is easy to do.

Rizky : Is this throwing movement easy to learn?

A : Easy

Rizky : Easy? Why is it easy?

A : Because there's only a little movement, it's not difficult

In terms of giving instructions, the research team considered the subject to be clear enough in giving so that it was easy to understand. This is important because in a method that only relies on spoken language, the ability of the instructor or teacher in giving instructions has a big influence on understanding the subject so that it makes it easier to execute it.

Rizky : Is it easy when you were taught by Mr. Amin, Mr. Adam, Mr. Satria, Mr. Adin, and Ms. Dara? Or is it difficult?

A : Easy

Rizky : The instructions were clear?

A : Yes, easy

Based on the information provided during the interview, the training with this method was no different from the method carried out at school by the teacher so that there was no difference in the impression on subject A.

Rizky : when compared to what your teacher teaches you, is there any difference?

A : No, it's the same

Rizky : But which one is better? With your teacher or with Mr. Adin?

A : *It's the same*

Rizky : *If you're going to be taught other movement using this technique, will you try it or not?*

A : *I will*

Rizky : *Using this technique or other technique?*

A : *ehm.. this technique is just the same with the school's technique*

However, it was different in terms of the psychological response of the subjects who were more comfortable with the research team than the teachers at school.

Rizky : *Are you happy when you were taught by the researchers, A?*

A : *Yes, I'm happy*

Subject A still chose this method even though it felt that there was no difference from what he had been taught at school, possibly because in giving instructions, the research team were more proficient in explaining so it was easier to understand.

Rizky : *If you're going to be taught other movement using this technique, will you try it or not?*

A : *I will*

Rizky : *Using this technique or other technique?*

A : *ehm.. this technique is just the same with the school's technique*

Rizky : *When it comes to sports lessons with your teacher, do you want to learn it using this technique or the one that the teacher usually uses?*

A : *This one*

Rizky : *Why?*

A : *It's easier*

Rizky : *If you're going to be taught other movement using this technique, will you try it or not?*

A : *Yes, I will*

After participating in this training, subject A admitted that he enjoyed exercising more.

Rizky : *If you use this technique, do you like sports more?*

A : *Yes*

Based on the analysis of interviews with subject B who received movement training using verbal and touch instructions also considered the one-handed overarm throw movement to be an easy movement for the same reason.

Rizky : *Is this throwing movement easy to learn?*

B : *Easy*

Rizky : *Easy? Why easy?*

B : *Because the movements were just preparation and throwing*

Rizky : *Because there's just a few movements?*

B : *Yes, just a few. Preparation and throwing*

In terms of giving instructions, the research team considered by the subject to be clear enough in giving so that it was easy to understand.

Rizky : *You've been practicing 7 times, how was it? Was it pleasant and easy?*

B : *Yes, pleasant and easy*

Rizky : *Was it easy to understand the movement?*

B : Yes, it was easy

Rizky : When Mr. Satria asked you to hold things, is it easier for you to understand or even more confused?

B : Yes, it's easier to understand

Rizky : Were the instruction given by Mr. Adin clear enough?

B : Yes, clear enough, easy

According to subject B, training with this technique makes it easier to learn movements compared to the technique taught by the teacher at school because in this technique, the subject is directed to feel the body parts that play a role in each phase of the throwing movement. In addition, by touching, it can clarify instructions given verbally.

Rizky : How's your teacher taught you, B?

B : They were just like, "B, throw it here, throw it there" just that

Rizky : So that B's hands were not directed somewhere? Just told you to throw it like that?

B : Yes, just told me to throw

Rizky : Which one is easier? Using this technique or your teacher's?

B : This one is easier

Rizky : Why this one is easier?

B : Because when I touch Mr. Satria I know how to move, how to do, so it's easier

Subject B felt happy during the training because he felt his skills were increased. This improvement is directly proportional to the level of movement proficiency.

Rizky : Were you happy during the training?

B : Yes, so that I can throw it until it gets stuck in the roof tile

Subject B chooses to use this technique and chooses to continue using this technique after this training is over and is willing to learn other movements using this training technique.

Rizky : When it comes to sports lessons with your teacher, do you want to learn it using this technique or the one that the teacher usually uses?

B : Yes, I want to use this technique

Rizky : If you're going to be taught other movement using this technique, will you try it or not?

B : Yes, I will, for example ball kicking movement

After participating in this training, subject B also admitted that he enjoyed exercising more.

Rizky : If you use this technique, do you like sports more?

B : Yes, I do, because it's fun I can even throw it to the roof tile, I wasn't be able to do that before

Discussion

The results above shows that the training technique with only verbal instructions provides practicality and higher throwing cycles in one training so that the number of repetitions also increases. However, when further analyzed, subjects who received training with this technique had a lower level of proficiency that is caused by ineffective communication between the supervisor and the subject due to the lack of understanding between the instructor and the subject, which results in no effective communication (Musheke & Phiri, 2021). The sender (instructor) and the

recipient (subject) must have the knowledge of how the message can be conveyed, in this case the sequence of throwing movements and the ability to articulate and interpret language or symbols (Romas & Sharma, 2017). Some examples of ineffective communication are the subject did not understand the meaning of rotation, while the instructor was not able to find equivalent words that the subject could understand. In other words, the level of proficiency of the subject's vocabulary also affects the results of training using this method.

Training with verbal and touch instructions has a smaller number of movement cycles but higher level of proficiency. Using two senses enrich perceptual information, increase accuracy and precision because each sense provides a different type of information (Bremner & Spence, 2017). The sense of touch is used to create mental images, namely the ability to form images or experiences without external stimuli as a result of repeated experiences involving various senses (Iswana, 2019; O' Dowd et al., 2022) which later used by the subject to form a virtual embodiment, a feeling that arises when the properties of a body or object are processed to become as if these properties are the properties of their own biological body (Richard et al., 2021). A positive psychological response will generate intrinsic motivation in carrying out physical activity. This is because the subject performs physical activity based on feelings of happiness, pleasantness, and interest so that they will do it more consistently (Deci & Ryan, 2015).

Conclusion

Using more than one sense to learn and proficient a movement is more effective than using only one sense. Because using more than one sense provides different types of information so the formation of accuracy and precision of the memory will be more perfect. In addition, using more than one sense can bridge the gap in knowledge and communication skills between the trainer/teacher/instructor and the subject/student so the proficiency of movements becomes better. With better control of movement, enjoyment in physical activity will be increasing and consistent, and it is hoped that a healthier lifestyle will be formed.

The weaknesses of this study are the small number of samples and the relatively short training time. Research with a larger sample, longer training time, and periodic re-evaluation is needed to describe the level of effectiveness of this training technique better.

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