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ORIGINAL SCIENTIFIC ARTICLE

JUMP MOVEMENT SKILLS PATTERN AMONG INDONESIA MENTALLY RETARDED CHILDREN USING D-MAT

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Authors' Contribution: A – Study design; B – Data collection; C – Statistical analysis; D – Manuscript Preparation; E – Funds Collection

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Abstract

The study purpose. Currently, the study was to get the pattern of jumping movement skills for mentally retarded children using D-Mat. It is as part of technology advanced to support physical activity and sport. While mentally retarded children have different ways to jump with normal children.

Materials and methods. The method used qualitative research using observational design. Participants are mentally retarded children aged 6-11 years who are divided into two groups, namely ages 6-8 years and ages 9-11 years. The data were collected through a process of observation and video recording. While the validation of the jumping movement test used observational and test-rater from 2 experts for the needs of mentally retarded children. Data analysis techniques used the Kruskal-Wallis test with a significant level of $p < 0.05$ and descriptive statistics.

Results. The findings concluded that the jumping movement pattern of mentally retarded children aged 6-11 years is forward jumping movement. They are easy to do it using D-Mat. This movement model is quite stable and easy to master.

Conclusions. Each component of the movement also shows fairly good stability according to the characteristics and needs of each child.

Keywords: children, D-Mat, jump, mentally retarded.

Introduction

Mentally retarded children have uniqueness and characteristics that cannot be equated with normal children in developing jumping movement skills. They have significant limitations in both intellectual functioning (Tajalli et al., 2013) and adaptive behaviour such as conceptual understanding, social skills and adaptive practice. They are also characterized by low fundamental movement skills (Maïano et al., 2019). While it is important to relate with the physical activity and health for children (Shams et al., 2021; Anderson et al., 2017). However, these limitations do not mean that they are not able to make good jumping movements. It is a basic skill that must be mastered by mild type mentally retarded children to help carry out daily activities, besides that jumping movement skills are also basic in the mastering of sports such as athletics, swimming or physical activity in sports (Wouters et al., 2019).

The results of observations at the Special Elementary School in Palembang in 2018 and 2019, mild mentally retarded children still have experience difficulties in doing basic jumping movements. Where jumping is a movement of lifting the body from one point to another using one leg as support. While the results of observations on mild type of mentally retarded children aged 7-12 years who participated in the development of athletic sports at the State University of Jakarta were also still difficult to jump. The results of the overall analysis of the observations concluded that mild types of mentally retarded children have quite good physical development for the level of limitations they have, but they are still stiff, afraid and unable to have a habit of balancing their bodies to jump.

Thus, mentally retarded children need special tests in physical fitness (Broadhead & Church, 2016; Addriana et al., 2019; Jaakkola et al., 2019; Rahmati Aran & Dehghanizade, 2020). Schools in Italy use an education system that does not discriminate against people with disabilities (Caldin, 2014). In this case, teachers must understand the implementation of education for schools with special needs (Demirok & Besgul, 2015).

Research related to movement skills, both basic movements in sports such as jumping, or other physical activities, is still not an interesting topic for researchers recently. It related to children with disabilities is often related to the concept of their social interactions and activities in their daily lives. However, the current study focuses on movement jumping to support their sports activities in ordinary schools that use D-Mat (Digital Matras) have not been carried out. Therefore, the gap between this study and previous research is seen in the concept of the jumping movement skill pattern using the D-Mat design which has previously been adjusted to the needs and limitations. The use of the D-Mat is a form of utilizing technological devices that have been used in the sports field. Physical activities for children with intellectual disabilities can be combined with entertainment, technology and education systems (Dandashi et al., 2015; Kucera, 2015; Růžičková & Hordějčuková, 2015; Chen et al., 2019). Technology has become a trend and innovation in sports (Kos et al., 2018). It appears in various activities such as games, competitions, training (Ratten, 2020), digital games for physical activity (Barnett et al., 2012), multimedia training used the technology device (Jinding, 2018; Sukendro et al., 2020; Sun, 2021).

Thus, the *purpose of the study* is to get the pattern of jumping movement skills for mentally retarded children using D-Mat. In this study, D-Mat has designed using technology device to use in jumping movement training for mentally retarded children in the school. Moreover, the study can contribute to the training program of basic movement in the special school, especially mild mentally disabled children.

Materials and methods

Research Approach

The research is a qualitative method that used an observational design. In this study, the research activity was aimed at observing the jumping movement skills patterns of mentally retarded children in Palembang without any changes to the characteristics and situations of the physical activity learning process in special schools (Creswell & Creswell, 2018). The observational design uses a cohort study because the group of participants involved in this study are mentally retarded children aged 6-11 years or mentally retarded children equivalent to the level of elementary school children in Palembang.

Participants

The participant is taken using the purposive sampling (non-probability sampling) which is 40 Indonesian children at a special school. The criteria for the participants were 1) children who have an IQ between 68-53 (Binet scale) or an IQ of 69-55 (Wescheler scale), 2) they do not have physical problems but have a slightly slower physical development than average children, 3) the child has a height and weight that is not different from other children, even physically difficult to distinguish from normal children. The body weight is between 20-30 kg. the participant divided into 2 groups, i.e 6-8 years (n = 20), and 9-11 years (n = 20). The observation process of jumping movement skills is helped by the parent.

Process of Collecting Data

Jumping movement skills of mentally retarded children were recorded using video. The jumping movements skills assessment provides a score in the form of a True-False form test, where true scores are scored as 1 (one) and wrong is 0 (zero). There are three types of jumping movements, namely jumping forward, backward, and sideways. The components of mastery of basic jumping movement for mentally retarded children are assessed through 6 components, consisting of 1) leg posture 2) knee movement, 3) hip movement. 4) body movements, 5) hand movements, 6) harmony movement. Table 1 presented the variables and their components of jumping movement skills.

Table 1. Aspect and Components of Jumping Movement Skills

The aspect of Jumping Movement Skills	Components
Jumping Forward	1. leg posture,
Jumping Backward	2. knee movement,
Jumping sideways	3. hip movement,
	4. body movements,
	5. hand movements,
	6. harmony movement

Procedure

The research process begins with technical testing activities in preliminary research. Technical trials for the assessment of jumping movement skills were implemented on other mentally retarded students (n = 10) who were not research subjects with the same characteristics for 2 months (August - September 2020). The technical test activities were recorded as data analysis documents. Whereas for reliability activities used a test rater who is an expert in cases of mentally retarded children. The two evaluators of this instrument were independent colleagues who were also involved during the observation process of research activities. Thus, the assessment process for participants has valid trust and reliability values. The results of the reliability assessment showed a high level of reliability, namely 0.867.

Testing of participants is carried out at school. The testing process has been scheduled according to the time of the study from October 2020 to March 2021. The time of the research did not change the physical learning activities and sports of mentally retarded students at school. Students will be guided and directed to use D-Mat to perform jumping movements. During the implementation of the activity, peers also provide observations of the results of student movements. The camera is installed to record all the activities of mentally retarded students. The results of recordings and observations of peers or researchers are evaluated together for analysis related to jumping movement patterns.

Statistical Analysis

The jumping movement skill difference test was carried out by comparison between age groups using the Kruskal-Wallis test with a significant level of $p < 0.05$. Meanwhile, the data of the test results per group used statistical descriptive.

Results

The results of the data analysis show that the level of group jumping movement of mentally retarded children has variations according to their physical conditions and needs. The results of descriptive calculations between the two groups are as follows.

Table 2. The mean and standard deviation of two groups in the jumping movement skills aspect

An aspect of Jumping Movement	6-8 Age Years Group			9-11 Age Years Group		
	N	M	Sd	N	M	Sd
Jumping Forward	20	19.78	2.85	20	21.83	3.68
Jumping Backward	20	17.57	2.44	20	19.77	3.08
Jumping Sideways	20	18.88	2.76	20	18.05	2.96

Significant at 0.05 level

Table 2 shows the result of mean and standard deviation in process of jumping movement practice for mentally retarded in each aspect of jumping movements; 1) 6-8 age years group; jumping forward 19.78±2.85, jumping backwards 17.57 ± 2.44, and jumping sideways 18.88 ± 2.76. 2) 9-11 age years group; jumping forward 21.83±3.68, jumping backwards 19.77 ± 3.08, and jumping sideways 18.05 ± 2.96.

The group with an age range of 6-8 years conclude that mentally retarded children have more forward jumping movement patterns, followed by sideways and backward jumps. Meanwhile, mentally retarded children aged 9-11 years have a jump movement pattern that has a forward jump movement pattern, then followed by jumping backwards and sideways. This means that the pattern formed for the jumping activity of mentally retarded children aged 6-8 years or aged 9-11 years has the stability for forwarding jumping movement (fig. 1).

Statistically significant differences ($p < 0.05$) were observed for all the components of jumping forward movement ($p = 0.318$). For 6-8age years, the hand movement is easy to do, while for 9-11 age years, the hand movement and harmony movement is easy to do by mentally retarded (fig. 2).

Statistically significant differences ($p < 0.05$) were observed for all the components of jumping forward movement ($p = 0.187$). For 6-8 age years, the leg posture is easy to do, while for 9-11 age years, the leg posture, hand movement and harmony movement are easy to do by mentally retarded (fig. 3).

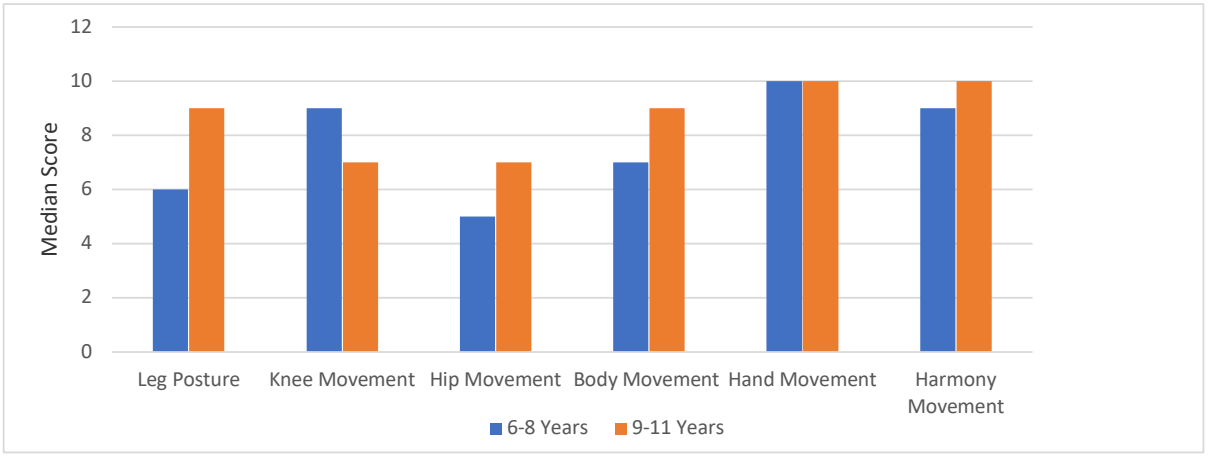

Figure 1. Components of Jumping Forward Movement by Age Group

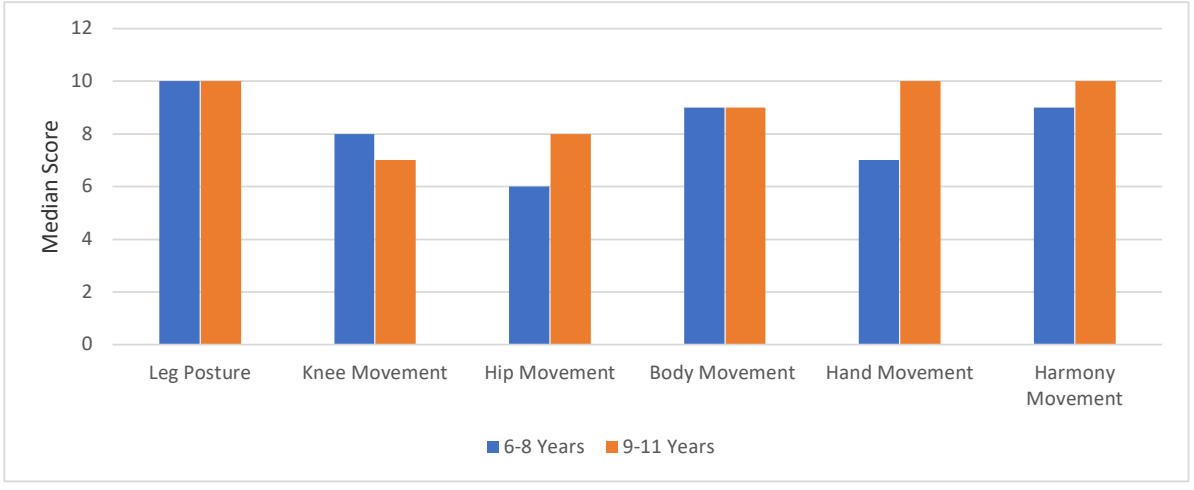

Figure 2. Components of Jumping Backward Movement by Age Group

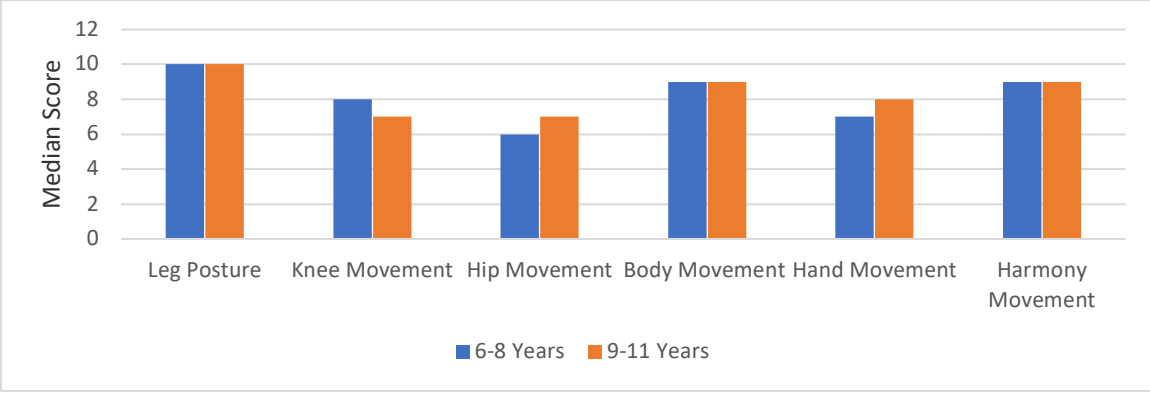

Figure 3. Components of Jumping Sideways Movement by Age Group

Statistically significant differences ($p < 0.05$) were observed for all the components of jumping forward movement ($p = 0.267$). For 6-8 age years and 9-11 age years, the leg posture influences the jumping backward movement by mentally retarded.

Discussion

The pattern of jump movements from the results of data analysis during the test shows that both the 6-8 age year group or 9-11 age year group is dominated by forward jumping movements with variations, namely jumping with the hand at the waist, jumping with swinging hands, jumping with clapping, jump with your arms outstretched, jump with your arms crossed forward and shout "Banzai". For the pattern of the jump back movement, the variations that are formed are jumping backwards with a swinging hand and jumping backwards by clapping the hands. While the pattern of the jump movement to the side that is formed is a combination jump with swinging hands, combination jump by clapping, and combination jumping with outstretched hands.

It is known that jumping for mentally retarded children is a continuous asymmetric skill and involves taking off and landing with the same foot. They are required to have greater leg strength and dynamic balance so that the resulting jump can be successful and can combine with other basic movements. Also, the help of tools for basic movement training is very important. D-Mat provides an easy way for coaches to guide mentally retarded children. So, technology becomes a new pattern in providing training media (Sharples & Whelan, 2020). Many a tool or technology device is for the jump movement training (Masci et al., 2013; Wiksten et al., 2002).

The finding shows that the jumping skill pattern of mentally retarded children has good basic skills, because of balance, movement control, and locomotor so that they can perform forward and backward movements (Zeng et al., 2019; Gandotra et al., 2020). Every movement for children should be fun (Sumantri, 2015). Coordination between the arms and legs plays an important role in controlling movement (DiRocco et al., 2016). In this case, the motor pattern influences the jump movement (Matsuzaki & Hentona, 1994). Each jump movement in children also shows a different level. This could be due to gender differences (Bryant et al., 2014; Hardy et al., 2010).

Another weakness found in this study referred to the activity of jumping using one leg that was not yet formed or supported the body's objections. Even though, this skill is also important in body management so that the level of balance or foothold can be perfectly formed. Lots of sports or children's daily activities use jumping movements. Thus, the results of this study also provide a major contribution to the jumping movement skills of mentally retarded children who support their daily activities that have been limited or slow. Moreover, mentally retarded children also take a long time to resolve new situations. They showed their best reactions when they followed the routine and consistently experienced it. Mentally retarded children cannot face an activity or task for a long time. They are less able to consider things, distinguish between good and bad and distinguish right from wrong. This is due to their limited abilities so that mentally retarded children cannot first imagine the consequences of an action.

This study trains how to build consistency in the actions given to mentally retarded children in mastering basic movement skills. The treatment process must be given one by one so that they can develop their physical abilities and knowledge of each basic movement skill. From the division of the two age groups, it is known that children aged 9-11 years have been able to show the development of mastery of the jumping movement not only forwards, but also backward movements that are more balanced.

Conclusions

Based on the conclusion of the research results, the D-Mat makes it easy for mentally retarded children to jump because all the information needed is presented on the digital mat. From the three aspects of jumping, mentally retarded children have a level of balance and harmony in making the jump forward. The combination between the limbs is also more aligned, causing 5 variations of the forward jumping movement. The implication of this research can be seen from the understanding of the concept of mastery of basic jumping movements that must be mastered first by mentally retarded children is jumping forward. Because this movement is easier and the balance of the body can be maintained stably. This way, the coaches at the special school can proceed with the backward and side jump design concept. Therefore, this research can still be developed again with a combination of the concept of various types of games that can be enjoyed and provide stimulation to mentally retarded children in carrying out physical activities. Besides, the results of this

study can also be followed by an in-depth study related to another basic jumping.

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Conflict of interest

There is no conflicts of interest to declare.

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МОДЕЛЮВАННЯ НАВИЧОК СТРИБКОВОГО РУХУ ЗА ДОПОМОГОЮ D-MAT ТЕХНОЛОГІЇ СЕРЕД ДІТЕЙ З ПОРУШЕННЯМ ІНТЕЛЕКТУАЛЬНОГО РОЗВИТКУ В ІНДОНЕЗІЇ

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Авторський вклад: A – дизайн дослідження; B – збір даних; C – статаналіз; D – підготовка рукопису; E – збір коштів

Реферат. Стаття: 6 с., 2 табл., 3 рис., 32 джерела.

Мета дослідження полягала в тому, щоб отримати, за допомогою D-Mat, модель навичок стрибкових рухів для дітей з порушенням інтелектуального розвитку. D-Mat – передова технологія для підтримки фізичної активності та спорту, вичення закономірностей формування рухових навичок, це є важливим у зв'язку з тим, що діти з порушенням інтелектуального розвитку мають різні способи стрибати у порівнянні з нормальними дітьми.

Матеріали та методи. Використано якісне дослідження із застосуванням методу спостереження. Учасниками є діти з порушенням інтелектуального розвитку віком 6-11 років, які поділяються на дві групи, а саме вік 6-8 років та вік 9-11 років. Дані були зібрані у процесі спостереження та відеозйомки. При валідації стрибко-рухового тесту використовувалися спостереження та тест-рейсер від 2-х експертів. Для аналізу даних використовували тест Краскала-Уолліса зі значущим рівнем $p < 0,05$ та описову статистику.

Результати. Встановлено, що модель стрибкового руху у дітей з порушенням інтелектуального розвитку у віці 6-11 років є стрибковим рухом уперед. Його легко змоделювати за допомогою D-Mat. Ця модель руху є досить стійкою і легкою для освоєння.

Висновки. Кожен компонент руху має досить хорошу стійкість відповідно до особливостей і потреб кожної дитини.

Ключові слова: діти, D-Mat, стрибок, розумово відсталі.

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