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DEVELOPMENT OF INTERACTIVE LEARNING MULTIMEDIA FOR IMPROVING THE RESULTS OF BOTTOM *PASSING* AND *BOTTOM SERVICE* SKILLS IN PEDAGOGY SPORTS VOLLEYBALL GAMES FOR ELEMENTARY SCHOOL STUDENTS

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Abstract

This study aims to develop and evaluate the effectiveness of interactive learning multimedia in improving lower passing and lower service skills in elementary school students in the Mencirim area. The results of development research are not only the development of an existing product but also to finding of knowledge or answers to practical problems. Research and development methods are also defined as research methods used to produce certain products and test the effectiveness of those products. In this study, the researcher produced a product in the form of an application *(software),* while the product in question is in the form of interactive learning multimedia intended for elementary school students on the lower passing material and *service* This is done to help teachers in conveying subject matter to students and the researcher hopes that students will also be able to understand certain material more easily. Data collection techniques use interviews, tests, and documentation. The data was analyzed through product validity analysis and trial data analysis using data collection techniques. This can be proven before the use of interactive multimedia, the results of students' pretest skills in the bottom *passing* of the mini volleyball game got an average score of 51.25 while the results of students' skills in the lower *service* got an average score of 51.50. Then a similarity test of the two variants was held called the normality and homogeneity test. In the normality test of the pretest *passing* under L count = 0.137 while L table = 0.190. If L counts < L table then the data is normally distributed. Then in the homogeneity test, F count = 1.579. From the list of distributions F with a comparator of 20 and a denominator of 20, we get F table = 2.086 (α=0.05), so F calculates = 0.470 and F table = 2.086. Because F calculates < F table, it can be concluded that the variance of the data is relatively the same. Meanwhile, the results of the students' pretest skills in the *service* under the mini volleyball game got an average score of 51.5, then a similarity test of two variants was held called the normality and homogeneity test. In the normality test of the pretest *service* under L count = 0.071 while L table = 0.190. If L counts < L table then the data is normally distributed. Then in the homogeneity test, F count = 0.470. From the list of distributions F with a comparator of 20 and a denominator of 20, we get F table = 2.086 (α=0.05), so F calculates = 0.470 and F table = 2.086. Because F calculates < F table, it can be concluded that the variance of the data is relatively the same. After the initial data (pretest) is obtained, the treatment will be carried out, the researcher will use interactive learning multimedia, and after all the learning processes are completed, a post-test is carried out. *Post-tests* are carried out to find out the final condition after treatment.

Keywords: Multimedia Interactive Learning, Passing Down, Service Down, Volleyball, Elementary School, Motor Skills, Learning Motivation, Problem-Based Learning, Physical Education.

INTRODUCTION

The development of the current world of education has begun to be seen, in an era that is sophisticated towards the presence of technology today, it requires educators to be ready to face the millennial generation, namely the generation where they are faster than what is taught regarding the use of technology. One of the uses of technology in education is to find learning materials that can be easily searched on the internet, so that advances in technology and information have changed the way people learn. The sophistication of technology provides a great response in playing an

important role in educating the nation, so technology must be utilized as much as possible to achieve better educational goals. Teachers are required to be able to use the tools that can be provided by the school, and it is possible that these tools are in accordance with the development and demands of the times. In addition to being able to use the available tools, teachers can also develop skills in making learning media that they will use if the media is not yet available (Sunarno, 2017). association was found between children's age and the likelihood of developing pes planus. Previous studies investigated the correlation between the Foot Posture Index (FPI) version 6, comprising six items, clinical measurements, foot anthropometry, and other radiological data regarding foot position in children aged 5 to 8 [6]. The results showed a positive correlation between FPI-6 and the Navicular Drop (ND) test and Center of Pressure (COP) Sway Index (CSI) in children aged 5 to 8 years. Three prominent foot posture indicators (FPI-6, ND, and CSI) can be used effectively as primary tools or preferences in clinical practice. Research on the treatment of flat feet has been carried out by researchers from various countries, such as China [12], Spain [13], the United States [14], Japan [15], Italy [16], Greece [13] and Germany [17]. These studies emphasize the importance of early screening to detect flat feet and treatment for sufferers to maintain their physical condition and overall health. However, this aspect still needs more attention, especially in sports education. This is evidenced by the need for more research discussing flat feet in the context of students' physical education performance. Research that discusses the relationship between flat feet and balance and students' physical performance is limited, so the results of this research have an essential role in overcoming and preventing bad possibilities in the future. This study aims to determine the relationship between flat feet, body balance, and physical performance of junior high school students.

METHOD

This research is planned to be carried out at SDN 106790 Sei Mencirim. The time for this *developmental research* is carried out in December-February of the 2022/2023 school year in an odd semester. The reasons for choosing the place of this research are as follows:

No research has been conducted with the same treatment in the school.

The school has never used interactive multimedia in the implementation of the learning process, especially in the bottom passing and *service materials. This research is planned to be carried out at SDN 106790 Sei Mencirim. The time for this developmental research is carried out in December-February of the 2022/2023 school year in an odd semester. The reason for choosing this research site is considered as follows: No research has been conducted with the same treatment in the school. The school has never used interactive multimedia in the implementation of the learning process, especially in the bottom passing and service materials. Lack of Variations in Learning Media causes low student skills. There is a sense of curiosity among researchers about they use of interactive multimedia, and whether it is effective if used in learning bottom passing and service. For researchers, it is possible to get support to obtain the data needed in the implementation of research.*

In fact, the media used by teachers when teaching volleyball materials is only modest such as pictures, volleyballs, nets, courts and other teaching materials such as student and teacher handbooks. Mini volleyball as an alternative is a good learning and suitable for elementary school students. *The passing* that is usually done by students is not in accordance with the growth and development of students as it should be because students are still small and children's arms are not strong enough if they use a real volleyball). association was found between children's age and the likelihood of developing pes planus. Previous studies investigated the correlation between the Foot Posture Index (FPI) version 6, comprising six items, clinical measurements, foot anthropometry, and other radiological data regarding foot position in children aged 5 to 8 [6]. The results showed a positive correlation between FPI-6 and the Navicular Drop (ND) test and Center of Pressure (COP) Sway Index (CSI) in children aged 5 to 8 years. Three prominent foot posture indicators (FPI-6, ND, and CSI) can be used effectively as primary tools or preferences in clinical practice. Research on the treatment of flat feet has been carried out by researchers from various countries, such as China [12], Spain [13], the United States [14], Japan [15], Italy [16], Greece [13] and Germany [17]. These studies emphasize the importance of early screening to detect flat feet and treatment for sufferers to maintain their physical condition and overall health. The impact of flat feet can be felt on body balance. Body balance is divided into two types: statistical and dynamic balance. Statistical balance relates to maintaining a still posture with limited movement. In contrast, dynamic stability is the ability to perform movements while maintaining or restoring stability [18]. The condition of the feet is an essential element that can influence maintaining body balance [19].

The condition of the feet plays a vital role in maintaining an individual's performance and physical activity, especially concerning agility and change of direction, which significantly influence balance and coordination. Factors such as posture, balance, and support are reliant on the health of the feet. Abnormal foot conditions, such as flat feet, also impact physical performance and balance [20]. *Participants* for this research were selected using random sampling and consisted of 109 junior high school students from five schools in Surabaya, Indonesia. Their age range is between 1214 years. To ensure a natural situation, researchers collaborated with physical education teachers. In addition, researchers obtained permission from the respective school principals by obtaining research permission and research ethics guidelines.

Research Design

The plantar surface is still concave and is to the medial side of the foot axis; grade II occurs when the medial edge of the plantar surface becomes straight and does not cross the median axis of the foot; and grade III occurs when the medial edge of the plantar surface becomes convex and crosses the axis of the foot [21].

The stork standing balance test measured the students' static balance while standing on one foot with closed eyes [20, 22, 23]. The test was conducted three times, and the best score was recorded. The objective of this test was to maintain this position for the maximum possible duration. The modified bass test was used to measure the students' dynamic balance during and after movement with a validity of 0.83 and a reliability of 0.93 [20]. This research conducted the test three times, and the best result from the three trials was recorded. The test evaluated the students' balance performance while moving and after movement. The test was considered valid and reliable in measuring student's dynamic balance. The Y-agility Test is utilized to assess agility and is conducted reactively, as described by [24]. The best time out of eight attempts is selected for further analysis. The Illinois Change of Direction Test involves setting up a rectangular area measuring 9.3 by 7.2 meters, as described by [25]. The best time out of three attempts is recorded as the ILL score, representing the time to complete the Illinois test.

Statistical Analysis

Data are presented using mean and standard deviation. Data analysis was done using nonparametric statistical tests to analyze the relationship between flat feet and students' balance and physical performance. The Spearman Rank test is used to see the significance level of the relationship between variables, the strength of the relationship, and the direction of the relationship. Variables are declared correlated if the sig value is <0.05. At the same time, the strength of the relationship uses the criteria of 0.00-0.25, very weak correlation, 0.26-0.50 moderate correlation, 0.51-0.75 strong correlation, 0.76-0.99 very strong correlation, and 1 is perfect correlation. The direction of the relationship is expressed with a positive or negative value; if the value is negative, the relationship between the two variables is in the same direction, whereas if the value is negative, the relationship is not in the same direction. The data will be analyzed and processed quantitatively using SPSS software version 24.0. Data analysis uses Spearman Rank. The results of the analysis will be presented in the form of tables and graphs for easier understanding.

RESULTS

teacher and student handbooks. Penjas teachers also revealed that the media carried out by penjas teachers was indeed less effective and only so, based on teacher observations, there were still many students who made mistakes and did not understand when doing *lower passing* and lower *service*.

It is very difficult for teachers to get learning media that is suitable for use when learning about lower *passing* and lower *service* materials. Based on information on the lower *passing* and *lower service materials* in physical education books in elementary schools, there is less variety and the learning models are few. In elementary school textbooks, the material *on the bottom* passing *and the* bottom service of mini volleyball is still common, only limited to explaining *the technique of bottom* passing and bottom *service* and there are no learning models of bottom *passing* and bottom *service* so that students understand the material being taught.

The lower passing *and* lower service *learning model* that has been carried out by penjas teachers still uses the old model contained in the Penjas textbook, in the book, the lower passing and *lower service* material is only slightly explained. Not only that, in the book there are no types of mini-volleyball games to develop students' skills in

doing bottom *passing* and *bottom service* mini-volleyball games. So that learning becomes less effective because the learning model of lower *passing* and lower *service* is monotonous with direct to-the-core movement, there are no steps that make it easier for students to receive material. This condition reflects that the learning model of passing below and *service* The average, standard deviation, minimum value, maximum value, and number of samples (N) for the four parameters measured in three levels of flat feet severity: Normal, Grade 1, and Grade 2, as well as the overall total shown in Table 2. These parameters are static balance, dynamic balance, change of direction, and speed. The data shows that the higher the severity of flat feet, the lower the average results for each parameter measured, except speed, which shows an increasing trend.

It is interpreted that Grade Feet has a significant relationship to static balance, Dynamic Balance, Agility, and Change of direction, which has a value of .000<0.05, as shown in Table 3. The strength of the relationship between grade feet and static balance is in the strong correlation category, Dynamic balance is in the strong correlation category, agility is in the strong category, and change of direction is in the strong category. The relationship's direction for static and dynamic balance is negative. In contrast, agility and change of direction are positive, which means that the better the foot grade, the longer the static balance and dynamic balance test results will be. In contrast, the resulting time will be shorter for agility and change of direction.

DISCUSSION

This study investigated the correlation between flat feet on static and dynamic balance and students' physical performance in the school environment. One hundred nine students from 5 elementary schools in East Java, aged 12 to 14, participated in this research. Data was collected using measuring instruments: the wet footprint test, the stork standing balance test, the Bass test, the Y agility test, and the Illinois Change of Direction test. Spearman Rank analysis is used to analyze the correlation of flat feet with static and dynamic balance and students' physical performance in the school environment.

The results showed that flat feet were significantly correlated with students' body balance. These findings support previous research conducted by [26, 27], who revealed that flat feet significantly affect body balance. This is in balance with [19], who found that the condition of the feet significantly influences overall body balance. Imbalances in the feet can cause muscles, tendons, and ligaments to overwork, increasing the chance of injury and fatigue. How a person stands and moves can also be affected, causing stability and coordination problems. This finding aligns with research by [3, 4], who reported that foot disorders can increase the likelihood of injury and decrease physical activity and performance endurance. The results of this study also explain that the presence of flat feet has a negative effect on students' physical performance in school activities. This may be due to the body's imbalanced influence on the musculoskeletal structure, leading to the overuse of muscles, tendons, and ligaments, thereby increasing the likelihood of injury and fatigue in individuals with flat feet. However, this finding differs from [22, 28] research findings that explained no relationship between flat feet and body balance.

Another finding in this research is the positive influence of flat feet on students' agility and ability to change direction. This is because to change direction quickly, a person

must have balance, coordination, and speed. Body balance is essential for human movement and activities [19, 23, 29]. Maintaining body balance relies on rapid and continuous feedback from various sensory systems. The visual system provides information about the surrounding environment, the vestibular system provides information about body position and movement in space, and the somatosensory system provides information about pressure, touch, and body movement [18]. However, body balance is not simply a statistical process; it is dynamic, allowing movement, changing positions, and adapting to different situations. Therefore, body balance is a complex process that requires integrating various physiological systems and continuous adaptation to the surrounding environment [29, 30, 31].

Additionally, [11] emphasized that disorders that affect the condition of the feet can interfere with a person's athletic performance and increase the risk of injury. Having abnormalities in the legs can cause a decrease in physical abilities, resulting in decreased endurance and stability when exercising, and can make a person more susceptible to injury. It is essential to monitor the condition of students' feet and take steps to address underlying problems to maintain physical health and avoid injury [12, 13, 14, 15].

Compared to our findings, it is noteworthy that some previous research [22, 28] reported no significant relationship between flat feet and body balance. These discrepancies may arise from differences in sample characteristics, measurement methods, or analytical approaches. Further investigation is warranted to reconcile these inconsistencies and gain a deeper understanding of the complex interplay between foot health, body balance, and physical performance in school-aged children.

CONCLUSION

This study elucidates the significant correlation between flat feet and students' body balance, as well as its impact on physical performance in school activities. These findings underscore the importance of monitoring foot health among students and implementing interventions to address underlying issues. Future research could explore additional factors influencing the relationship between flat feet, body balance, and physical performance, as well as evaluate the effectiveness of interventions aimed at improving foot health in school-aged children.

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