

Development of a web-based system for storing and accessing kinesthetic motor skills data of young volleyball players

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ABSTRACT

Along with the development of the world of sport today, efforts to manage the sport of volleyball are very important to implement, both in management in society, education, and management at the local, national and international levels. The aim of this study was to develop an instrument capable of identifying players' movements, based on dominant movements in volleyball games, using technology integrated with a system for later storage on the web. The research method had four stages, namely (1) preliminary study, (2) validation by experts, (3) acceptance test, and (4) usefulness test. Validation was carried out by volleyball experts, sports talent identification experts, and coaches, with assessment indicators including suitability, accuracy, ease, and practicality. Acceptance testing was carried out by applying the instrument to 120 young volleyball players to collect categorization data. The results showed that the instrument was effective and feasible to use in identifying the kinesthetic movements of young volleyball players, and providing recommendations for players with good kinesthetic movement abilities. This instrument is expected to help sports teachers and volleyball coaches in identifying players' movements more easily.

KEYWORDS

Development; Instrument; Movement; Kinesthetic; Volleyball

1. INTRODUCTION

Along with the development of the world of sport today, efforts to manage the sport of volleyball are very important to implement, both in management in society, education, and management at the local, national and international levels, all of which require a more efficient system in sports management in order to achieve achievements (Nugroho et al., 2023). The current conditions show that volleyball achievements in Indonesia resemble a progressive structure, which indicates that only a small number of athletes have succeeded in achieving achievements because one of the main causes is the lack of management at the regional level (Sepdanius et al., 2023). In searching for potential volleyball athletes, of course an inclusive approach is used (Wang et al., 2023). Taking into account various factors, the essence of this process is that growth and maturity become the main concepts in understanding the identification, selection and development of young athletes (Rifki & Ariston, 2021). In Indonesia, to participate in centralized training, athletes must go through a selection process, including provincial and national level selection. However, this is only done after participants have acquired skills from existing clubs. Based on this information, there are shortcomings in the method for measuring participants' kinesthetic movement abilities at the players' level, so this deficiency is an issue that needs to be resolved in volleyball clubs in Indonesia.

Selection of talented young athletes in volleyball is a multifaceted process involving various factors. Anthropometric measurements, such as weight, height, and age, play an important role in identifying potential talent and predicting future performance in sports (Barajas-Pineda et al., 2023). The collaborative efforts of the sports and education departments, together with the commercial value of volleyball, are crucial in attracting more young individuals to participate in the sport, in the hope of addressing the talent training problem for volleyball reserve personnel (Rifki et al., 2022). The effects of relative age and certain physical attributes, such as jumping ability and height, are important factors in the process of talent identification and selection in youth volleyball (Rubajczyk & Rokita, 2020).

Bakathnot only based on intelligence, but also accompanied by a will and productive performance (Castro et al., 2021). To realize this talent, appropriate intervention is needed, namely intervention in a differentiated program (Mann et al., 2017). Differentiation programs that are the embodiment of sports achievements need to be prepared from a child's age (S. Nugroho et al., 2021). Starting from the maturation of multilateral movements, determining the right sports tendencies, and training programs that are in accordance with the growth and development of children, it is very important to determine the achievements of athletes in the golden age (Fischetti & Greco, 2017). However, there are still many other factors that determine a child's success in the future to achieve

achievements, namely intelligence, psychological factors, and external factors such as heredity from parents or environmental influences (Johnston et al., 2018). Children's involvement in sports participation is one of the factors in producing successful athletes in the future (Rifki et al., 2022) This involvement shapes social relationships that influence children's self-perception, achievement orientation, and patterns of motivated behavior.

Screening of young athletes for volleyball involves the use of various instruments to assess athletes' self-efficacy, mental toughness, motor competence, and physical performance. One of them is by using a kinesthetic movement instrument, namely IVITI (Indonesian Volleyball Identification Talent Instrument) which consists of several skill tests, including 1) throwing the ball with 1 hand, 2) throwing the ball with 2 hands, 3) catching the ball with 2 hands, 4) bouncing the ball on the floor, and 5) agility 6) balance. This method works by using technology that is combined with the system and will later be stored on a web that can be accessed. However, this instrument has not examined from the perspective of how the perception of genetic factors of athletes involves parents as former athletes, fanatics and not at all. And the perception of genetic factors of athletes involving the environment as a private field, a place of residence close to the field and many former athletes.

Important the selection of talented athletes is carried out to predict the performance of athletes who are able to carry out training activities for a long period of time and continuously (Razak et al., 2023). Conny Semiawan stated that there are two key clues in observing and interpreting giftedness: 1) Giftedness is a special and external characteristic that is universal in nature which is innate and is the result of the interaction of environmental influences, 2) Giftedness is also determined by the needs and tendencies of the culture in which it is located (Vater et al., 2017).

Various conceptualizations of talent have been interpreted as: innate (i.e., derived from biological elements present at birth), multidimensional (i.e., consisting of capacities from multiple cognitive, physical, and psychological categories), emergent (i.e., involving interactions among factors that are multifaceted), dynamic (i.e., evolving over developmental time due to interactions with the environment and random gene expression) and symbiotic (i.e., cultural and social factors will determine an individual's ultimate talent score) (Baker et al., 2019). Therefore, physical and physiological growth and development of sports talent is closely related to sports achievement (Pelletier, 2023). Physical and physiological development can be improved over time with exercise (Chuckravanen et al., 2019). Then to support performance and physical skills when the process is running is determined by kinesthetic, psychological, genetic and environmental intelligence (Syväoja et al., 2021). These four indicators are very important to know in order to make it easier for prospective

athletes to accept and apply the training program they receive so that they can reduce the boredom and frustration of athletes in participating in heavy training (Westerbeek & Eime, 2021). Kinesthetic intelligence is closely related to a person's ability to develop movements so as to display movements that have maximum performance with a beauty that is different from other people (Koçak, 2019).

The purpose of this study was to develop an instrument capable of identifying players' movements, based on dominant movements in volleyball games, using technology integrated with a system for later storage on the web.

2. METHODS

2.1. Design and participants

This research is a developmental study based on the Borg and Gall theoretical framework, which has been modified into four main stages: (1) preliminary study, (2) expert validation, (3) acceptance testing, and (4) usability testing. Participants in this study were 120 young volleyball players from Indonesia. Permission for data collection was granted by the club where the study was conducted.

2.2. Procedures and instruments

The validation stage was carried out by three experts, namely volleyball experts, IT experts and coaches. These experts assessed the instrument based on indicators of suitability, accuracy, comfort and practicality. At the acceptance test stage, the instrument was directly applied to participants, and the satisfaction was measured with a five-point scale. This product focuses on kinesthetic motion instruments to identify athlete talent, using technology combined with the system and later stored on a web that can be accessed.

2.3. Statistical analysis

Product testing was carried out with an evaluation stage by experts and was declared suitable for use. For the acceptance test stage, a descriptive analysis of the percentages of the data obtained from the use of the instrument was carried out with the statistical software SPSS (Statistical Package for Social Sciences) version 25.

3. RESULTS AND DISCUSSION

This research produced a product in the form of an application system that can store data from kinesthetic motor skills tests and can be accessed. Based on expert assessments, this system is feasible and can be used. The following shows the product and its implementation in Figure 1.

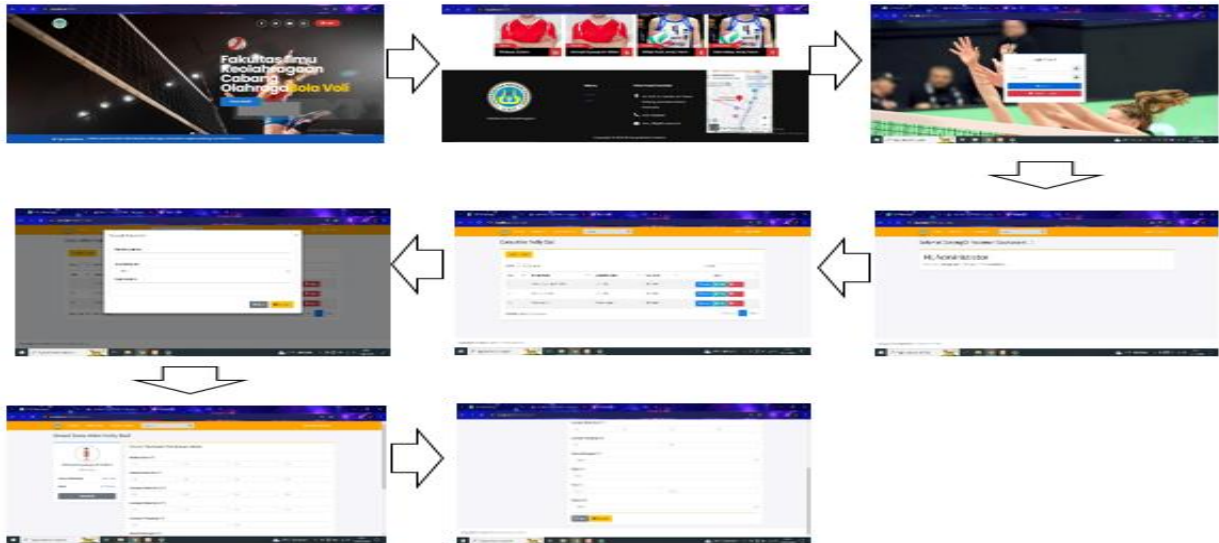


Figure 1. Sequence of implementation of system use

Figure 1 shows the order of execution of the system. The process begins by opening the main page to be able to enter the system application. After that the athlete data management dashboard page appears. On the dashboard page you can add, edit, delete and print athlete data. After completing these steps, the athlete data can be used. Regarding the satisfaction of the participants with the instrument presented in this work, it is observed that the vast majority were satisfied, with a total of 101 participants (equivalent to 84 percent of the sample), and other 18 participants were very satisfied, which is equivalent to 15 percent. Only one person stated that was quite satisfied. No one was dissatisfied or very dissatisfied, which shows that the results were very positive (Table 1).

Table 1. Satisfaction of the sample with the instrument

No	Answer	Amount	
		F	%
1	Very satisfied	18	15%
2	Satisfied	101	84%
3	Quite satisfied	1	1%
4	Dissatisfied	0	0%
5	Very dissatisfied	0	0%
		120	100%

The success of movements in volleyball can be seen from the beginning of its development (Hambali et al., 2021). Children who have good kinesthetic motor intelligence are expected to be able to undergo a volleyball training program well and be able to accept the coach's instructions to be applied in a sports movement (Nunes et al., 2021). Kinesthetic movements in volleyball include throwing the ball with 1 hand, throwing the ball with 2 hands, catching the ball with 2 hands, balance, agility, bouncing the ball on the floor (Nugroho et al., 2021). These movements, if done correctly and using the right sports equipment, can reduce the risk of injury (Hong et al., 2014). In exercising, every movement that is done requires flexibility and energy (Tohidin et al., 2021). By identifying the child's ability to perform techniques, it becomes the basis for seeing good muscle activation in children. With this identification, it is hoped that children will be able to digest and perform each movement well during the training process (Zubir et al., 2022). The ability of nerves to process information so that the body remains in a balanced state is individual and not everyone has it and is able to utilize it well.

In addition, research on the relationship between sports participation and academic performance suggests that sports activities involving complex motor skills, such as martial arts and team sports, can have a positive impact on academic performance (Ishihara et al., 2020). It emphasizes the positive influence of various sports activities, where the use of certain measuring devices can contribute to aspects of physical and cognitive performance (Sepdanius et al., 2023).

Furthermore, the relevance of physical activity and sports participation is recognized in national sports policy documents, which emphasize the importance of sport in overall well-being, including academic performance (Westerbeek & Eime, 2021). This further highlights the need for measurement tools in sport activities, as they assist in the understanding and implementation of policies aimed at increasing physical activity and sport participation (Rifki, Farma, et al., 2022). In the field of instrumentation and measurement, the application of artificial intelligence, especially deep learning, is recognized as a revolutionary development that demonstrates the potential for sophisticated and precise measurement techniques in sports activities (Khanafer & Shirmohammadi, 2020). In addition, in conducting measurements or a test must also involve an assessment from the perspective of the athlete's genetic factors and the athlete's environment. This indicates that the renewal of a measuring instrument, where technological advances, such as artificial intelligence, are expected to further improve its ability to evaluate sports performance. Overall, it can be concluded that measuring instruments in sports activities have a variety of impacts, not only limited to the influence on physical performance, but also on academic performance and policy frameworks.

Based on the results of the study and strengthened by the existing references, it is proven that the development of a child movement identification instrument in the sport of volleyball has been proven to be able to provide a significant contribution. Very good assessments from volleyball experts, sports talent identification experts, and coaches show that this instrument is effective in identifying children's kinesthetic movements in the context of volleyball. The results of this study confirm that this study has succeeded in designing a method to classify children's levels in volleyball. The design developed includes four components, namely kinesthetic, psychological, genetic and environmental. This method works by using technology combined with a system that will be stored on the web so that the results can be obtained immediately after data collection. This instrument makes it easy for coaches and sports teachers to identify and optimize the potential for kinesthetic movement in children in volleyball.

4. CONCLUSIONS

The development of this instrument plays an important role in improving athlete performance in volleyball. The development of an instrument to identify children's movements has been proven to be successful in making a significant contribution, with a high level of validity and reliability. This method works by using technology combined with a system that will be stored on the web so that the results can be obtained immediately after data collection. This instrument is effective in identifying children's kinesthetic movements and can be relied on to provide accurate recommendations for children with good kinesthetic movement abilities to participate in volleyball. The implication of this study is that the use of a child movement identification instrument in volleyball not only improves athlete performance and training effectiveness, but also makes a positive contribution to understanding the relationship between sport, holistic well-being, and the implementation of sports policy.

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CONFLICTS OF INTEREST

The authors declare no conflict of interest.

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