Comparison of Quickness Item Test Results Based on Energy Source

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Abstract

Objective. This study aimed to investigate how various energy sources impact individual reaction speed, formulate strategies for performance enhancement, and add to the body of scientific knowledge. This investigation examined the differences in quickness test outcomes according to various sequences of energy sources, emphasizing the impact of these sequences on quickness or reaction time among university students.

Materials and methods. The investigation included 32 individuals from the Faculty of Sports Education and Health at Universitas Pendidikan Indonesia, class of 2022, comprising an equal number of male and female participants. The pretest-posttest experimental design involving a single group was employed, wherein the participants' speed was assessed through a straightforward test utilizing a falling ruler that needed to be caught with two fingers. A posttest was administered following the pretest, which featured the correct sequence of energy sources. The posttest utilized an incorrect order of energy sources to assess variations in performance. Data collection was conducted through purposive sampling, followed by analysis utilizing a paired t-test.

Results. The findings indicated a notable reduction in quickness performance during the posttest. The statistical analysis indicated a significant reduction in the distance the ruler fell during the posttest when compared to the pretest ($p < 0.05$). A majority of participants demonstrated a reduction in reaction time, particularly among those with less favorable posttest outcomes. In summary, the arrangement of various energy sources notably influences performance in the quickness test. The results highlight the significance of adhering to established guidelines during training or testing, and offer valuable perspectives on how enhancing energy sources can elevate performance across different scenarios, particularly in athletic endeavors.

Conclusion. The findings of this study indicate that varying sequences of energy sources significantly influence performance outcomes in the quickness test. The examination of the pretest and posttest outcomes revealed a distinct variation in participants' speed following the implementation of the energy source sequence. Suggestions for additional investigation involve examining a wider range of energy sources, utilizing varied subjects, taking psychological factors into account, and implementing long-term studies to gain a more profound understanding of the impact of energy sources on performance and health.

Keywords: Comparison Results Test Item Quickness, Based on Source Energy.

Introduction

In physical conditioning training, quickness (action reaction) holds significant importance. In numerous domains where human performance is assessed, speed (Quickness/Action) stands out as a critical factor. The reaction is incorrect. One important parameter is often used to evaluate system performance and efficiency (Raharjo, 2022). Quickness can be understood as the capacity to react and accomplish tasks in the least amount of time, applicable to physical activities, machine operations, and various other contexts. However, incorrect One issue that arises in studies on quickness is how the sequence or outcomes of quickness test items can be affected by various factors, one of which is the arrangement of energy sources utilized to support the activity or operation (Raharjo, 2022). In the realm of sports, quickness is frequently assessed to evaluate an athlete's capabilities. An athlete's response to specific stimuli, such as initiating a run or executing particular maneuvers, is a key factor in this measurement.

Factors influencing quickness, including the type of energy source present in the body, are currently under examination. Studies in exercise physiology indicate that energy derived from anaerobic metabolism typically yields more explosive outcomes in speed tests compared to the more efficient aerobic energy (Mufid Fajrin, 2024). Aerobic and anaerobic endurance denote the capacity of the heart, lungs, and blood vessels to operate efficiently both at rest and during physical activity, facilitating the absorption of oxygen and its distribution to active tissues for utilization in the body's metabolic functions (Satwiko et al., 2020). As noted by Susilo in 2019 (Rezki et al., 2024), anaerobic power is an activity that enables the body to function without the assistance of oxygen. Consequently, anaerobic endurance differs from aerobic endurance. Power stand aerobics is a process of energy production that does not require oxygen from outside the human body. When conducting speed assessments and evaluating other physical conditions, adhering to established guidelines can enhance effectiveness. Sports Science. Combination of sports science This approach is highly comprehensive, drawing from interconnected fields to enhance athlete performance and assist coaches in their training methodologies (Rohendi & Rustiawan, 2020). Among the various established fields, Testing and Measurement stands out as a significant area of study within the sequence of energy sources. Coaches utilize this method to assess and analyze the performance of their athletes.

A test is a tool or methodology used for objective quantification and evaluation. Testing involves the execution of measurement and evaluation, or the manifestation of specific events (Septicasari et al., 2023). In the meantime, measurement typically presents qualitative challenges in acquiring measurement information (Faiz et al., 2022). This study seeks to analyze the results of the

comparison based on the provided background. Items evaluate speed according to the energy of the order source and the sequence in which they are arranged. This study aims to test the hypothesis that the sequence of energy sources utilized affects the outcomes of quickness test items. The study aims to identify patterns or trends that appear in a relationship. This also provides insights on how the selection order of energy sources can be optimized to enhance performance efficiency.

The Importance of the Study This study is essential as it offers vital understanding of how various energy sources can influence human performance, especially regarding reaction speed. The rising interest in performance enhancement techniques across sports, education, and health sectors suggests that the findings of this study may lay the groundwork for creating innovative, safer, and more effective strategies.

This study presents a unique approach by examining how various energy sources impact the speed of reactions. Many earlier investigations have focused solely on the impact of a single energy source, whereas this study emphasizes the significance of the sequence in which consumption occurs. Furthermore, employing a pretest-posttest approach with a varied participant pool offers a fresh viewpoint and more comprehensive data to explore the connection between energy sources and quickness performance. These findings could lead to additional exploration and advancements in creating improved energy products and educational initiatives.

Materials and Methods
Study Participants.

The sample for this study consisted of 32 students. The total participants were evenly distributed, comprising 16 men and 16 women. All participants are active students in the Sports Science study program at the Faculty of Sports Education and Health, University Education Indonesia, class of 2022, who are engaged in studying tests and measurements. Engaging in daily activities that encompass both academic tasks and extracurricular pursuits. The participants originate from a variety of ethnic backgrounds and socioeconomic statuses, though these elements are not the primary emphasis of the analysis. The students involved are currently working towards their undergraduate degrees, and the research took place at the Universitas Pendidikan Indonesia Stadium on April 26, 2024, May 2, 2024, May 16, 2024, and May 17, 2024.

Study organization.

This study employs a purposive sampling method to select participants in accordance with the intended application of the research. Prior to commencing the test items, students engage in preparations to guarantee that participants are adequately equipped to undertake the test in alignment with the predetermined criteria. This study aims to yield valid and representative results within the student population, thanks to a well-balanced participant composition and controlled methodologies. The meticulous selection process is designed to enhance both the internal and

external validity of the study, thereby allowing the findings to be applicable in a wider context (Muslihah et al., 2021). This study employed an experimental method featuring a one-group pretest-posttest design to assess variations in quickness performance, focusing on tests aligned with the sequence of energy sources as well as those that deviated from this sequence. This design entails assessing participants' capacity to adapt to the sequence and those that were not executed in line with the sequence. This method enables an evaluation of the impact directly on the same group. The study seeks to assess variations in quickness performance by analyzing the outcomes of the sequence of test items administered before and after participants undertake the test, which is associated with the source of energy order (SABILLAH, 2024). Study of methodology This involves two stages: a pretest and a posttest, conducted without any treatment. During the pretest phase, all participants underwent the quickness assessment without any intervention. Furthermore (BAYU, 2024). The data collected during the pretest is rejected as the initial measurement to compare the results after the reverse test. Additionally, the participants underwent a posttest, specifically a quickness assessment that utilized a method not aligned with the sequence of energy sources.

Statistical analysis.

This experiment was carried out with careful attention to pedagogical principles, including the establishment of a conducive environment, the provision of clear instructions, and the monitoring of each phase of the experiment. This process aimed to reduce external interference and guarantee the dependability of the results obtained. The findings of this study offer valuable insights into how the sequence of energy sources influences performance speed and are anticipated to serve as a foundational study for further exploration in related areas (Darmayanti et al., 2024).

1. Study of instruments and sourcing energy in item testing Which is used: Initial assessment (Based on the sequence of energy sources):Flexibility (Sit and Reach)
2. Quickness (Action Reaction)
3. Speed (20 Meters)
4. Agility
5. Strength Maximum Leg
6. Power Arm (Medicine Ball)
7. Power Legs (Tri Hop)
8. Power Arm Muscle Resistance (Push Up)
9. Power Stand Muscle Stomach (Back Up)
10. Power Stand Muscle Legs
11. Power Stand Anaerobic Lactacid
12. Aerobic Endurance (Balke Test)

Posttest (No in accordance order source

energy) :

1. Power Stand Aerobic (Balke Test)
2. Power Stand Anaerobic Lactacid
3. Power Stand Muscle Legs
4. Power Stand Muscle Stomach (Back Up)
5. Power Arm Muscle Resistance (Push Up)
6. Power Legs (Tri Hop)
7. Power Arm (Medicine Ball)
8. Strength Maximum Leg
9. Agility
10. Speed (20 Meters)
11. Quickness (Action Reaction)
12. Flexibility (Sit and Reach)

In implementation of the test This done 4 day, that is pretest on 26 April And May 2024. After that, the posttest was carried out on May 16 and 17, 2024.

Results

Statistical analysis serves as a mathematical framework for interpreting data, enabling the identification of patterns and relationships within it. The primary methods employed consist of probability distributions, hypothesis testing, regression analysis, and multivariate analysis (Elfaladonna et al., 2024). Probability distributions, including the normal distribution, are essential for comprehending the likelihood of results in a dataset. Testing hypotheses involves utilizing methods such as t-tests, ANOVA, or chi-square tests to assess assumptions and determine statistical significance. Regression analysis assesses the connection between independent and dependent variables, including predictions and trend modeling. Provisional Multivariate analysis, such as factor or cluster analysis, is utilized for grouping complex data (Elfaladonna et al., 2024). Methods This approach finds application across multiple domains, including business for sales forecasting, science for comprehending natural events, and social sciences for assessing human behavior, thereby facilitating decisions grounded in data (Ardyan et al., 2023).

The results of the descriptive statistics indicate that there are 32 respondents. The minimum value recorded is 3.0, while the maximum reaches 26.5 for the pretest, and 20.0 for the posttest. The amount of data on the pretest is 436.9, while on the posttest it is 346.1. Next, record the average on the pretest at 13,653, and the posttest at 10,816. With therefore, descriptive statistics This provides an overview of the average marks, distribution data, and score ranges (minimum

and maximum) before and after treatment concerning the results of the quickness test items categorized by energy sources.

The normality test is performed to determine if all variables follow a normal distribution. The normality test employs the Kolmogorov-Smirnov formula for calculations conducted with the SPSS 27 software. To determine if it is normal, if the significance level is greater than 0.05, it is considered normal; if the significance level is less than 0.05, it can be classified as abnormal. According to the data, the asymptotic significance (2-tailed) is 0.2, which is greater than 0.05, indicating that the data is normally distributed.

Test paired sample T- test

Paired Samples Test

		Paired Differences				
					95% Confidence Interval of the Difference	
		Mean	Std. Deviation	Std. Error Mean	Lower	Upper
Pair 1	Pretest - Posttest	2.8375	5.2291	.9244	.9522	4.7228

Paired Samples Test

		t	df	Sig. (2- tailed)
Pair 1	Pretest - Posttest	3,070	31	.004

The analysis indicates that the t-test yielded a ttable (df31) of 2.744, accompanied by a significance value of 0.004. Additionally, please note the calculation 3,070. Count 3,070 more significant from table 2.744, along with a p-value of 0.004, which is smaller than 0.05. It can be concluded that the alternative hypothesis has been accepted, while the null hypothesis has been rejected. The calculations indicate a notable difference in the averages between the pretest, which follows the order of energy sources, and the posttest, which does not adhere to this order, when analyzing the results of the quickness test items based on energy sources.

Discussion

Investigation This measure assesses the speed at which students utilize a straightforward method involving a ruler and a table. Individuals were instructed to intercept a 30cm ruler that was released unexpectedly. Suddenly, using two fingers and a ruler, I dropped it starting from the end,

measuring from 30 cm to 1 cm. The findings of the study revealed differences in speed capabilities among students, analyzed according to the distance the ruler descended before being intercepted. The data from the pretest and posttest were analyzed using paired t-tests to evaluate the significant differences between the two conditions. The statistical analysis results indicated a notable reduction in quickness performance following the test modification, as evidenced by the average distance the ruler fell during the posttest being less than that of the pretest ($p < 0.05$). The distribution graph indicates that the majority of participants exhibited a decline in performance, while the table provides descriptive statistics to summarize the average, standard deviation, and p-value for the pretest and posttest data.

The data reveals a pattern indicating that students who performed early pretests generally exhibit a decline in performance relative to their posttest results. This trend suggests that the sequence of energy sources influences the performance or current state of individuals engaged in physical condition assessments or activities. According to Mufid Fajrin (2024), studies in sports physiology indicate that energy derived from anaerobic metabolism typically yields more explosive outcomes in speed tests compared to the more efficient aerobic energy. The intensity of anaerobic activity is high for a short duration. It cannot be sustained over a longer period. Therefore, it is more effective to position it at the beginning of the test, prior to the aerobic component. The statement from (Rohaya, 2018) indicates that muscles contract under anaerobic conditions, leading to the anaerobic glycolysis process that generates ATP. This allows for intense muscle activity lasting several seconds, necessitating additional energy for activities exceeding 5-10 seconds in duration, while also resulting in the production of lactic acid. The accumulation of sour lactate will hinder glycolysis, leading to muscle fatigue (Candra et al., 2016).

In this study, if the anaerobic test (quickness/Action Reaction) is positioned at the beginning according to the sequence of existing energy sources, the outcome will be more effective. This is due to the production of sour lactate during anaerobic processes, and if there is an accumulation, it will lead to fatigue. The findings of this study further validate that the measurement method utilizing a ruler can effectively assess students' reaction abilities. The findings provide a foundation for further investigation into the impact of different treatments on speed abilities, along with practical applications for educational or training activities that necessitate enhanced quick reactions.

Conclusions

The findings indicate that the sequence of energy sources considerably influences the outcomes of the quickness test assessed through the method employed. The statistical analysis revealed a decline in the participants' quickness performance following the test, as evidenced by the reduced distances the ruler fell before being caught in the posttest. The results of the paired sample T-test indicate a difference between the pretest and

The posttest results are significant, supporting the hypothesis that the order of source energy directly influences quickness performance. The results underscore the significance of choosing the appropriate order of energy sources to enhance quickness performance in both physical and cognitive domains. The observed reduction in reaction time or enhancement in rapid response capability following the test suggests that the influence of energy sources must be taken into account across different domains that assess athletic performance. This study additionally paves the way for further advancements in related research endeavors. The findings of this study serve as a valuable reference for future inquiries and their implementation in coaching, sports, and educational development, emphasizing the importance of optimizing performance through the consideration of energy source factor.

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