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## THE IMPACT OF STRENGTH, FLEXIBILITY, AND MOTIVATION ON STUDENT DEVELOPMENT IN ELEMENTARY EDUCATION

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**Abstract.** Research problem the number of students who get scores below the minimum completeness criteria in the material on forward roll ability at Elementary School of 01 Situjuh Batua. The purpose of the study is to determine the effect of arm muscle strength, abdominal muscle strength, torso flexibility and motivation on forward roll ability at Elementary School of 01 Situjuh Batua. Quantitative research method. Path Analysis approach. The population of students in grades IV, V and VI totaling 108 people. Stratified random sampling technique. Sample of 22 students, data collection on arm muscle strength with pushups, abdominal muscle strength with sit-ups, torso flexibility with the KAKU test, motivation using data collection using questionnaires and forward roll ability tests. Research results: (1) arm muscle strength has a direct effect on forward roll ability, sig value = 0.008 < 0.05, has an effect of 16.8%. (2) abdominal muscle strength has a direct effect on forward roll ability, sig value = 0.001 < 0.05, has an effect of 26.5%. (3) torso flexibility has a direct effect on forward roll ability, sig value = 0.011 < 0.05 has an effect of 13.2%. (4) motivation has a direct effect on forward roll ability, sig value = 0.033 < 0.05 has an effect of 9.4%. (5) arm muscle strength has an indirect effect on forward roll ability of 1.9%. (6) abdominal muscle strength has an indirect effect on forward roll ability of 3.1%. (7) torso flexibility has an indirect effect on forward roll ability of 1.4%. (8) Arm muscle strength, abdominal muscle strength, trunk flexibility and motivation have a simultaneous effect on forward roll ability, Rsquare value = 0.740 with probability (sig) = 0.000. If the sig value is < 0.05, then these four variables have an effect on forward roll ability of 54.8%.

**Keywords:** Arm Muscle Strength, Abdominal Muscle Strength, Trunk Flexibility, Motivation and Forward Roll, Ability

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### I. INTRODUCTION

In an effort to improve the quality and quantity of human resources, education is expected to produce individuals who are intelligent, strong, skilled, and moral (Amin, Wahyuri, Irawan, Welis, & Ockta, 2023; Iqbal et al., 2024; Karisman et al., 2024; Oktadinata et al., 2024). The educational process is also expected to enable students to actively develop their capacity to acquire knowledge that suits their needs based on cognitive, affective, and psychomotor aspects (Andica et al., 2024; Ismail et al., 2024; Ockta & Hardiansyah, 2023; Safitri et al., 2024). Education that is expected is education that directs students as learning subjects who must effectively develop themselves in a planned manner through a system implemented by the government in order to improve the quality of education in order to create quality and useful

humans (Hambali et al., 2024; Haris et al., 2024; Insani et al., 2024c; Khani et al., 2024). Education becomes a process Human development that lasts a lifetime, has a very important role, namely providing opportunities for students to be directly involved in various learning experiences through the Physical Education (PE) learning process held at school (Budiman & Ockta, 2024; Ferdian et al., 2023; Nusri et al., 2024; Safitri et al., 2023).

The learning process of PE, sports and health is an integral part of the educational process that takes place in schools as formal educational institutions (Chinta et al., 2024; Hadinata et al., 2024; R. F. Illahi et al., 2024; Triani et al., 2023). Physical education, sports and health is a subject that aims to provide learning experiences through a series of physical movements to improve students' intellectual abilities, attitudes and abilities optimally (Atradinan & Ockta, 2024; Insani et al.,

2024a; Purwanto & Ockta, 2024; Sepriani et al., 2024). One of the physical education learning materials that must be given to students is gymnastics material. Gymnastics is an activity that provides valuable experience in everyday life and can be used as a means to achieve national education goals. Gymnastics is one of the physical education learning materials given to students that can optimize development in terms of their movement abilities.

Gymnastics is a body exercise that is chosen and arranged deliberately, carried out consciously and planned, systematically arranged to improve physical fitness, develop abilities, and instill mental and spiritual values (Bortoleto et al., 2023; Gasparetto et al., 2022; Lage et al., 2020). Gymnastics can improve physical fitness, prevent obesity, and improve motor skills in early childhood. From this understanding, it can be interpreted that gymnastics is a form of body exercise designed to increase strength, flexibility, agility, and body control carried out when performing gymnastic movements (Handayani et al., 2022, 2023). Floor gymnastics is part of the gymnastics material taught to students. Floor gymnastics consists of several types of movements, including forward rolls, backward rolls, handstands, tiger jumps, bridge positions, and candle positions. The ability to do floor gymnastics, especially forward roll movements, can only be achieved through a process of learning good movements. Because it is known that floor gymnastics movements cannot be done carelessly because they can cause serious injuries, therefore mastery of techniques is needed to support the success of doing forward rolls.

The forward roll movement is one of the parts of the gymnastics movement that is considered important to be learned by students. Although it has a level of difficulty in its implementation, it is expected that this movement is easy to implement during the learning process. This movement relies on the front of the body. Although the risk of injury may occur, it will not happen if students have a good understanding in implementing it. Arm muscle strength is part of the superior extremities. What is meant is the strength of the triceps and biceps whose movements are based on the elbow joint.

Abdominal muscle strength is useful for making it easier for students to do the final position of the forward roll and stabilize their movements (Amin, Wahyuri, Irawan, Welis, Gusni, et al., 2023a; Apriady et al., 2024; Likardo et al., 2023; Pranoto et al., 2024). The flexibility of the *togok* is expected to make it easier for students to maintain their body position close to their hands so that the rolling movement can be done optimally (Amin, Wahyuri, Irawan, Welis, Gusni, et al., 2023b; Insani et al., 2024b; Rambe et al., 2024; Yuliana et al., 2023). Good balance will maintain the starting position until the end of the forward roll movement so that it is not easy to shake. Adequate facilities and infrastructure will support the ability of students to roll forward at school. The teacher's teaching method used so that learning can be achieved by students to make it easier.

Learning Media that contains learning materials and delivers them in a more effective and efficient way, so that it

can stimulate students to absorb them better. In addition, there are other factors that support the process of implementing the forward roll movement, namely motivation (Arfi et al., 2024; Ockta et al., 2024; Pitnawati et al., 2023; Umar et al., 2023). Motivation is a form of encouragement that comes from outside or from within to achieve a desire or goal that is expected, with motivation, students will produce the ability to roll forward according to what they want (Adrizal et al., 2024; Al Zaki et al., 2023; Revalina et al., 2024; Sasmita et al., 2023). With the presence of several existing factors, it is hoped that students can get good results in the ability to roll forward (R. R. Illahi et al., 2023).

However, the results of observations conducted by researchers at Elementary School of 01 Situjuah Batua, especially for girls, do not seem to show good ability results, seen from the results of the forward roll ability scores that have been carried out by previous teachers, namely from 33 students only 15 students got good scores. When doing a forward roll, students have difficulty in doing the movement because the position when rolling the body is not optimal. This is influenced because students have weak arm muscle strength, it could be due to the lack of repetition of movements carried out by students or other factors, namely poor abdominal muscle strength so that the forward roll movement is not perfect because there is no abdominal muscle strength that helps stabilize the movement when the final position so that students cannot get up from the forward roll position.

The discomfort makes their bodies stiff when doing the forward roll movement. Based on the problems that have been described, the researcher suspects that the low ability of students to roll forward is caused by the strength of the arm muscles, abdominal muscle strength, torso flexibility, and student motivation. Therefore, the researcher is interested in conducting research on the ability of students to roll forward at Elementary School of 01 Situjuah Batua. And to see the causality between arm muscle strength, abdominal muscle strength, *togok* flexibility, and student motivation. Through this research, researchers hope to be able to solve and find solutions to the problems that are happening.

## II. METHODS

This study utilizes independent variables that influence dependent variables, along with intervening variables that explain the relationship between the two. The sample was selected using a stratified random sampling technique from a population of 108 students in grades IV, V, and VI, taking 20% for a total of 22 students. Permission was also obtained from the head of UPTD Elementary School 01 Situjuah Batua.

The research instruments include several tests to measure various student abilities: the Forward Roll Test to assess forward roll skills, the Push-Up Test to measure arm muscle strength, the Sit-Up Test to evaluate abdominal muscle strength, the KAKU Test to determine torso flexibility, and a Motivation Questionnaire to gauge student motivation.

### III. RESULTS AND DISCUSSION

In this section, the author will describe the description of the data obtained after conducting research at Elementary School of 01 Situjuah Batua. The data in this study consist of: data on students' forward roll ability as the dependent variable in the study, then arm muscle strength, abdominal muscle strength, trunk flexibility and motivation which are independent variables in the research conducted by the researcher. The normality test was conducted on the research variables using the Shapiro-Wilk Normality test with a significance level of  $\alpha = 0.05$  with the test criteria that  $H_0$  is rejected if the sig value obtained from the research data exceeds  $\alpha = 0.05$  and conversely  $H_0$  is accepted if the sig value is less than  $\alpha = 0.05$ , which this test can be simply stated as follows:  $H_0$  is accepted if the sig value  $< \alpha = 0.05$ , meaning the data is not normally distributed,  $H_a$  is accepted if the sig value  $> \alpha = 0.05$ , meaning the data is normally distributed.

TABLE I  
 SUMMARY OF RESEARCH DATA NORMALITY TEST

Variabel	Shapiro-Wilk p-value (Sig)	$\alpha$	Conclusion
X1	0,080	0,05	Normal
X2	0,280		
X3	0,288		
X4	0,078		
Y	<b>0,053</b>		

Linearity test is a test conducted to see whether each variable data of arm muscle strength, abdominal muscle strength, trunk flexibility, motivation tends to form a linear line against the variable of forward roll ability of students at UPTD Elementary School 01 Situjuah Batua, Lima Puluh Kota Regency. The  $H_a$  tested in this case is the data of arm muscle strength (X1), abdominal muscle strength (X2), trunk flexibility (X3), motivation (X4), has an influence on the forward roll ability (Y) of students at UPTD Elementary School 01 Situjuah Batua, Lima Puluh Kota Regency. The test criteria are  $H_a$  is accepted if the sign value  $>$  probability value 0.05.

TABLE II  
 SUMMARY OF RESEARCH DATA LINEARITY TEST

Variabel	Sig.	Information
X1 with Y	0,620	Linear
X2 with Y	0,167	
X3 with Y	0,548	
X4 with Y	0,757	
X1 with X4	0,627	
X2 with X4	0,215	
X3 with X4	<b>0,600</b>	

TABLE III  
 HYPOTHESIS TESTS

Variable	Path Coefficient (p)	Sig	Effect (%)
<b>Direct Effects</b>			
Arm Muscle Strength (X1)	-0.410	0.008	16.08
Abdominal Muscle Strength (X2)	0,35763889	0.001	26.05.00
Flexibility (X3)	-0.364	0.011	13.02
Motivation (X4)	0,21319444	0.033	09.04
<b>Indirect Effects</b>			
Arm Muscle Strength (X1)	0,08055556		01.09
Abdominal Muscle Strength (X2)	-0.174		03.01
Flexibility (X3)	0,08125		01.04
Simultaneous Effect	Rsquare = 0.740	Sig = 0.000	54.08.00

Direct Effects show that Arm Muscle Strength (X1) has a negative path coefficient of -0.410, indicating a significant decrease in performance, with a p-value of 0.008, which suggests this finding is statistically significant. This effect accounts for 16.8% of the overall impact. Abdominal Muscle Strength (X2), on the other hand, demonstrates a positive path coefficient of 0.515, implying that greater abdominal strength positively influences performance. This relationship is highly significant with a p-value of 0.001, contributing 26.5% to the overall effect. Flexibility (X3) presents a negative path coefficient of -0.364, also indicating a decrease in performance, with a p-value of 0.011, accounting for 13.2% of the impact.

Motivation (X4) has a positive path coefficient of 0.307, suggesting that increased motivation correlates with improved performance, with a significance level of 0.033, contributing 9.4% to the overall effect. Indirect Effects show a more nuanced picture. Arm Muscle Strength (X1) contributes 1.9% through indirect pathways with a coefficient of 0.116, while Abdominal Muscle Strength (X2) has a negative indirect effect of -0.174, accounting for 3.1%. Flexibility (X3) also has a positive indirect effect of 0.117, contributing 1.4%. Finally, the Simultaneous Effect of all variables shows a substantial combined impact, with an Rsquare value of 0.740, indicating that 74% of the variance in performance can be explained by these factors, and the significance level is 0.000. Overall, these results highlight the complex interplay between different fitness components and their collective influence on performance outcome

### IV. CONCLUSIONS

Based on the results obtained in this study, several conclusions can be concluded as follows.1. There is a direct influence of arm muscle strength on the ability to roll forward

of students at Elementary School of 01 Situjuh Batua. 2. There is a direct influence of abdominal muscle strength on the ability to roll forward of students at Elementary School of 01 Situjuh Batua. 3. There is a direct influence of togek flexibility on the ability to roll forward of students at Elementary School of 01 Situjuh Batua. 4. There is a direct influence of motivation on the ability to roll forward of students at Elementary School of 01 Situjuh Batua. 5. There is an indirect influence of arm muscle strength on the ability to roll forward through the motivation of students at Elementary School of 01 Situjuh Batua. 6. There is an indirect influence of abdominal muscle strength on the ability to roll forward through the motivation of students at Elementary School of 01 Situjuh Batua. 7. There is an indirect influence of trunk flexibility on forward roll ability through student motivation at Elementary School of 01 Situjuh Batua

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