

Relationship Between Theoretical Knowledge and Practical Skills to Wards Learning Outcomes of Rhythmic Gymnastics of Students at the Muhammadiyah 2 Semarang High School

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Abstract

Physical Education, Sports, and Health emphasizes comprehensive student development through the integration of cognitive and psychomotor domains. In rhythmic gymnastics learning, academic achievement is influenced by both theoretical knowledge and practical skills simultaneously. This study aimed to analyze the relationship between theoretical knowledge and practical skills with rhythmic gymnastics learning outcomes among eleventh-grade students of SMA Muhammadiyah 2 Semarang. A quantitative non-experimental approach with a two-predictor correlational design was employed. The sample consisted of 30 students selected using total sampling. Data were collected through Likert-scale questionnaires with high reliability (Cronbach's Alpha > 0.90). Results revealed a strong positive and significant relationship between theoretical knowledge and learning outcomes ($r = 0.648$; $p < 0.05$), and a moderate significant relationship between practical skills and learning outcomes ($r = 0.516$; $p < 0.05$). Simultaneously, both variables contributed 45.4% to the variance of learning outcomes ($R = 0.674$; $R^2 = 0.454$). These findings highlight the importance of systematically integrating conceptual learning and structured practice to enhance rhythmic gymnastics learning outcomes.

Keywords: learning outcomes; physical education; practical skills; rhythmic gymnastics; theoretical knowledge

1. Introduction

Education is a systematic process aimed at developing individual potential holistically, encompassing aspects of knowledge, attitudes, and skills (Law No. 20 of 2003 on the National Education System). Physical Education, Sports, and Health (PJOK) is an integral part of the education system that uses physical activity as a medium for comprehensive student development (Rusli Lutan, 2001). The success of PJOK learning is measured through learning outcomes that reflect changes in student behavior following the learning process. Various efforts have been made to improve PJOK learning outcomes, one of which is through the application of demonstration methods assisted by media, which have been proven effective in improving learning outcomes from an average of 77.05 with 82% completion to 81.76 with 94% completion in the second cycle (Hannas & Ariyanto, 2023). This finding confirms that the selection of appropriate learning methods and media greatly determines the success of the teaching and learning process in PJOK.

According to Bloom's Taxonomy (LW et al., 2001), learning outcomes encompass three main domains: cognitive (knowledge), affective (attitude), and psychomotor (skills), which are interconnected in a unified learning process. In PJOK learning, especially in rhythmic gymnastics material, students are required not only to understand the basic concepts of movement, tempo,

and rhythm, but also to perform those movements accurately and in a coordinated manner. As part of gymnastics sports with distinctive characteristics, the success of rhythmic gymnastics performance is influenced by both internal and external factors in students. Research by Yuliani & Priyono (2020) on 39 rhythmic gymnastics athletes showed that internal motivation-encompassing physiological needs and self-actualization-more dominantly influences achievement compared to external motivation, with an average internal factor score of 4.6 versus 4.5 for external factors. This finding reinforces the importance of attending to students' internal factors, including knowledge and conceptual readiness, in rhythmic gymnastics learning. Furthermore, several studies also show that gymnastic activities contribute to improvements in students' motor ability and cognitive development (Nurdaningsih, 2018).

In school learning practice, an imbalance is often found between theoretical and practical scores. Some students have good conceptual understanding but are less than optimal in motor practice, while others are able to perform movements well but lack understanding of the underlying basic principles. This condition indicates a gap between the cognitive and psychomotor domains that could potentially affect overall learning outcomes (Hasan et al., 2025). Initial observations at SMA Muhammadiyah 2 Semarang showed that approximately 60–65% of eleventh-grade students had difficulty adjusting their movements to music rhythm, partly due to less varied teaching methods and insufficient understanding of movement concepts.

Theoretically, motor skill learning requires systematic stages, starting from conceptual understanding (cognitive stage), structured practice (associative stage), to movement automation (autonomous stage) (Fitts & Posner, 1967). If the conceptual understanding stage is not optimal, skill mastery will not develop maximally (Indrayogi et al., 2022). Therefore, it is important to empirically examine the extent to which theoretical knowledge and practical skills are related to rhythmic gymnastics learning outcomes. This study aims to determine the partial and simultaneous relationship between theoretical knowledge and practical skills with rhythmic gymnastics learning outcomes among eleventh-grade students of SMA Muhammadiyah 2 Semarang.

2. Method

This study employed a quantitative approach with a two-predictor correlational design to examine the relationship between theoretical knowledge (X_1) and practical skills (X_2) with rhythmic gymnastics learning outcomes (Y). A correlational design was chosen because the study did not provide treatment to the subjects, but rather examined the relationships between variables as they naturally occurred in the field (Sugiyono, 2019). The study was conducted at SMA Muhammadiyah 2 Semarang during the even semester.

The population in this study consisted of all 30 eleventh-grade students of SMA Muhammadiyah 2 Semarang. The sampling technique used was total sampling, meaning the entire population was used as the research sample. This is consistent with the view of Arikunto et al. (2019), who stated that when the population is fewer than 100 people, the entire population can be used as research subjects.

Research instruments are measurement tools used to collect data systematically and in a standardized manner, so that valid, reliable, and scientifically accountable data are obtained (Sugiyono, 2019; Arikunto, 2019). In Physical Education, Sports, and Health (PJOK) research, the

use of structured instruments such as questionnaires and observation sheets has been widely applied as effective data collection tools, both in experimental and correlational research. Pratiwi & Priyono (2022), in their study on the modification of floor mats for floor gymnastics learning, used questionnaires obtained from expert evaluation and student respondents to empirically measure product feasibility. Meanwhile, Fathoni & Sudarmono (2023), in a classroom action research study on rhythmic gymnastics material, used observation, documentation, and checklists as structured data collection instruments. Furthermore, Ramadhan & Priyono (2022) utilized the Indonesian Physical Fitness Test (TKJI) as a standardized instrument to measure the effectiveness of gymnastics on students' physical fitness. These various approaches reflect the importance of selecting measurement tools that are appropriate and aligned with the variables and research objectives to be achieved.

The instruments used in this study consisted of questionnaires with a 4-point Likert scale, where each research variable was measured through 10 statement items. The Likert scale was chosen because it allows respondents to express their level of agreement or disagreement with each statement in a graded manner, so that the data obtained is ordinal and can be analyzed using parametric statistics (Sugiyono, 2019). The score range of 1 to 4 was used to avoid respondents' tendency to choose a neutral position (central tendency bias), so that each respondent is encouraged to take a more definitive stance on each statement item (Arikunto, 2019). The three variables measured through this instrument include: (1) theoretical knowledge of rhythmic gymnastics (X_1), encompassing understanding of movement concepts, rhythm principles, tempo, and coordination; (2) rhythmic gymnastics practical skills (X_2), measuring students' ability to perform movement sequences in accordance with music rhythm; and (3) rhythmic gymnastics learning outcomes (Y), representing the students' overall learning achievement covering cognitive and psychomotor aspects.

Before being used in data collection, all instruments were first tested for validity and reliability. Validity testing was carried out using the Pearson Product Moment correlation technique, by correlating the score of each statement item with the total score of the relevant variable. A statement item was declared valid if the calculated r -value was greater than the r -table at a 5% significance level (Arikunto, 2019; Sugiyono, 2019). Reliability testing was performed using the Cronbach Alpha (α) coefficient, with the criterion that an instrument is declared reliable if $\alpha \geq 0.70$ (Sugiyono, 2019). This testing standard is aligned with that applied in similar PJOK studies, where instruments with high Cronbach Alpha values guarantee measurement consistency and stability across respondents and over time (Ramadhan & Priyono, 2022; Pratiwi & Priyono, 2022).

The instrument test results showed Cronbach Alpha values of 0.938 for the theoretical knowledge variable (X_1), 0.941 for the practical skills variable (X_2), and 0.951 for the learning outcomes variable (Y). All three values are well above the minimum required threshold ($\alpha \geq 0.70$), so all research instruments were declared highly reliable and suitable for use in data collection in this study (Sugiyono, 2019; Arikunto, 2019).

The data analysis technique in this study comprised several systematic stages: (1) descriptive statistics to describe the characteristics of each variable's data; (2) normality testing using the Kolmogorov-Smirnov test to ensure that the data distribution is normal; (3) linearity testing to determine whether a linear relationship exists between the independent and dependent variables; (4) Pearson Product Moment correlation to analyze the partial relationship between variables; (5)

partial t-test to test the significance of the relationship of each independent variable with the dependent variable individually; and (6) simultaneous F-test to test the relationship of both independent variables together with the dependent variable, with a significance level of $\alpha = 0.05$ (Sugiyono, 2019).

3. Result

Descriptive statistics

Table 1. Descriptive statistics of research variables

No	Variabel	N	Min	Max	Mean	Std. Deviasi
1	X1(Theoretical Knowledge)	30	16	39	29,37	7,38
2	X2 (Practical Skills)	30	16	40	29,70	7,27
3	Y (Learning Outcomes)	30	17	40	29,90	6,68

Based on Table 1, the highest mean value was found in the learning outcomes variable (29.90), followed by practical skills (29.70), and theoretical knowledge (29.37). The standard deviation of all three variables ranged between 6–7, indicating moderate data variation and a relatively even distribution of values. The variance, which was not excessively high, indicates data homogeneity among respondents.

Normality Test

Table 2. Results of kolmogorov-smirnov normality test

No	Variabel	KS Statistic	Sig.	Syarat	Ket.
1	X1 (Theoretical Knowledge)	0,1441	0,516	Sig. > 0,05	Normal
2	X2 (Practical Skills)	0,1709	0,308	Sig. > 0,05	Normal
3	Y (Learning Outcomes)	0,1274	0,669	Sig. > 0,05	Normal

Based on Table 2, all variables had significance values greater than 0.05, so the data were normally distributed. Thus, the assumption of normality was met and parametric correlation analysis could be performed.

Linearity Test

Table 3. Results of linearity test

No	Variable Relationship	Sig. Deviation from Linearity	Requirement	Result
1	X1 (Theoretical Knowledge) → Y (Learning Outcomes)	0,412	Sig. > 0,05	Linear
2	X2 (Practical Skills) → Y (Learning Outcomes)	0,386	Sig. > 0,05	Linear

The significance values of deviation from linearity for both variable relationships were greater than 0.05, so it can be concluded that the relationship between the independent and dependent variables is linear. This indicates that increases in knowledge as well as skills tend to be followed by proportional increases in learning outcomes

Pearson Correlation**Table 4. Correlation of theoretical knowledge with learning outcomes**

No	Variable Relationship	r Calculated	r Table	Sig.	Correlation Level	Result
1	X1 → Y (Theoretical Knowledge → Learning Outcomes)	0,648	0,361	0,000	Strong	Significant

Based on Table 4, the calculated r-value of 0.648 is greater than the r-table of 0.361 and the significance value of $0.000 < 0.05$. This indicates a positive and significant relationship between theoretical knowledge and learning outcomes. Based on the interpretation of the correlation coefficient (Sugiyono, 2019), this value falls into the strong category. This means that the higher students' theoretical understanding of rhythmic gymnastics concepts, the higher their learning outcomes.

Table 5. Correlation of practical skills with learning outcomes

No	Variable Relationship	r Calculated	r Table	Sig.	Correlation Level	Result
1	X2 → Y (Practical Skills → Learning Outcomes)	0,516	0,361	0,004	Moderate	Significant

The calculated r-value of 0.516 is greater than the r-table of 0.361, with a significance value of $0.004 < 0.05$. This indicates a positive and significant relationship between practical skills and learning outcomes. The correlation falls into the moderate category, meaning that practical skills make a meaningful contribution to improving learning outcomes.

Coefficient of Determination**Table 6. Simultaneous coefficient of determination**

R = multiple correlation coefficient	R square = coefficient of determination	Adjusted r square = corrected coefficient of determination	Std. Error = standard error	Contribution
0,674	0,454	0,414	4,512	45,4%

The R value of 0.674 indicates a strong simultaneous relationship between theoretical knowledge and practical skills with learning outcomes. The R Square value of 0.454 indicates that 45.4% of the variation in learning outcomes can be explained by both independent variables, while the remaining 54.6% is influenced by other factors outside the study.

Partial t-Test**Table 7. Results of T-test**

No	Variable	t calculated	t table	Sig.	Result
1	X1 (Theoretical Knowledge) → Y (Learning Outcomes)	4,578	2,052	0,000	Significant
2	X2 (Practical Skills) → Y (Learning Outcomes)	3,137	2,052	0,004	Significant

The calculated t-values of both variables are greater than the t-table and the significance values are < 0.05 . This indicates that, partially, both theoretical knowledge and practical skills have a significant relationship with learning outcomes. The higher t-value for the theoretical knowledge variable indicates that this variable is more dominant in explaining the variation in learning outcomes.

Simultaneous F-Test**Table 8. Results of F-test**

F calculated	F table	Sig.	Sig. Result
11,214	3,350,000	0,000	Significant

The calculated F-value of 11.214 is greater than the F-table with a significance value of $0.000 < 0.05$. This indicates that theoretical knowledge and practical skills simultaneously have a significant relationship with rhythmic gymnastics learning outcomes.

4. Discussion

The correlation analysis results showed that theoretical knowledge had a positive and significant relationship with rhythmic gymnastics learning outcomes ($r = 0.648$; $p < 0.05$) in the strong category. This finding indicates that mastery of basic movement concepts, rhythm principles, tempo, and coordination techniques plays an important role in determining the quality of students' learning achievement. This is consistent with Bloom's Taxonomy (Anderson & Krathwohl, 2001), which asserts that the cognitive domain is the foundation for the development of psychomotor competence. Students who have good conceptual understanding will be better able to identify movement errors, regulate tempo accuracy, and synchronize movements with music more effectively. This finding is further supported by Kurniawan & Sudarso (2020), who proved a significant relationship between the knowledge and skills domains in PJOK learning.

Practical skills showed a positive and significant relationship with learning outcomes ($r = 0.516$; $p < 0.05$) in the moderate category. Azizah & Efendi (2025) found that students' active involvement in rhythmic gymnastics activities consistently contributes to improvements in coordination, balance, flexibility, and movement accuracy. Nevertheless, the correlation value in the moderate category suggests that practical skill mastery alone cannot comprehensively explain the variation in learning outcomes without adequate conceptual understanding. This is consistent with Indrayogi et al. (2022), who found that a Project Based Learning approach can optimize rhythmic gymnastics motor skills more meaningfully when students first understand the underlying movement concepts.

Simultaneously, theoretical knowledge and practical skills contributed 45.4% to the variation in learning outcomes ($R = 0.674$; $R^2 = 0.454$; $F = 11.214$; $p < 0.05$). The dominance of theoretical knowledge as the stronger predictor is reflected in the higher t-value compared to practical skills (4.578 versus 3.137), indicating that cognitive readiness plays a more central role in determining the quality of learning outcomes. The remaining 54.6% of the variation in learning outcomes not explained by these two variables is believed to be influenced by other factors, such as learning motivation, teaching quality, availability of facilities and infrastructure, and students' physical condition (Syah, 2001). These findings affirm that effective rhythmic gymnastics learning is not sufficient to focus only on movement repetition, but needs to integrate conceptual understanding, structured visual demonstration, gradual practice, and continuous feedback as a unified holistic learning process (Khilman, 2024; Ariyanto, 2023; Hasan et al., 2025).

5. Conclusion and Recommendation

Based on the results of data analysis and discussion, it can be concluded that theoretical knowledge and practical skills have a positive and significant relationship with rhythmic gymnastics learning outcomes among eleventh-grade students of SMA Muhammadiyah 2 Semarang. Partially, theoretical knowledge showed a stronger relationship ($r = 0.648$) compared to practical skills ($r = 0.516$), indicating that conceptual understanding serves as an important foundation for learning achievement. Simultaneously, both variables contributed 45.4% to the variation in learning outcomes ($R^2 = 0.454$), confirming that the systematic integration of cognitive and psychomotor aspects is the key to successful rhythmic gymnastics learning. Based on the findings of this study, several recommendations are proposed for various stakeholders involved in physical education learning, particularly in the context of rhythmic gymnastics instruction.

- a. For Physical Education teachers, it is strongly encouraged to adopt an integrated teaching approach that prioritizes conceptual understanding before advancing to motor practice. Given that theoretical knowledge demonstrated a stronger predictive relationship with learning outcomes, embedding conceptual discussions, visual demonstrations, and movement analysis into daily instruction will substantially enhance students' overall achievement.
- b. For school institutions, adequate provision of learning facilities and instructional media — particularly audio-visual tools — is highly recommended to bridge the gap between cognitive comprehension and psychomotor execution. A well-resourced learning environment plays a critical role in supporting the simultaneous development of both domains.
- c. For curriculum developers, rhythmic gymnastics learning sequences should be systematically structured to follow progressive stages — from conceptual introduction and guided demonstration to independent practice and reflective feedback — ensuring that each phase reinforces the next in a coherent and holistic manner.
- d. For future researchers, it is recommended to investigate the remaining 54.6% of variance in learning outcomes that was not accounted for in this study. Variables such as student motivation, instructional quality, physical fitness, peer interaction, and the availability of learning resources merit further empirical exploration to provide a more comprehensive understanding of the factors influencing rhythmic gymnastics achievement.

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