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# Project-Based Learning Model to Improve Student's Hands and Feet Motor Skills in Rhythmic Gymnastics

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***ABSTRAK***

*Kurangnya pengetahuan dan kemampuan siswa dalam gerakan tangan dan kaki dasar senam ritmik adalah kekuatan pendorong di balik penelitian ini. Tujuan dari penelitian ini adalah untuk menguji bagaimana pendekatan pembelajaran berbasis proyek mempengaruhi keterampilan motorik siswa untuk gerak kaki dan gerak tangan senam ritmik. Penelitian ini menggunakan prosedur kuasi-eksperimental. Alat yang digunakan adalah tes senam ritmik yang mengevaluasi gerakan tangan dan kaki. Populasi penelitian adalah siswa kelas XI SMA PGRI 1 Majalengka berjumlah 50 siswa. Purposive sampling digunakan untuk mendapatkan 25 sampel. Berdasarkan pengolahan dan analisis data, rata-rata hasil tes awal adalah 15,93, dan rata-rata hasil tes akhir adalah 18,86. Hal ini diperkuat dengan hasil analisis data yang menunjukkan bahwa $t_{hitung}$ 7,89 lebih tinggi dari $t_{tabel}$ 2,14. Kontribusi penelitian ini menyimpulkan bahwa pendekatan pembelajaran berbasis proyek dapat membantu keterampilan motorik siswa.*

**ABSTRACT**

Lack of knowledge and proficiency among students in rhythmic gymnastics' fundamental hand and foot movements is the driving force behind this study. The goal of this study is to examine how a project-based learning approach affects students' motor skills for rhythmic gymnastic footwork and hand movements. This study employed a quasi-experimental procedure. The tool utilized is a rhythmic gymnastics test that evaluates hand and foot motions. There are 50 students in class XI at SMA PGRI 1 Majalengka as population. Purposive sampling was used to get 25 samples. According to data processing and analysis, the average initial test result was 15.93, and the average final test result was 18.86. This is collaborated by the data analysis results, which showed that $t_{count}$ 7.89 is higher than $t_{table}$ 2.14. The contribution of this research concludes that a project-based learning approach can help students' motor skills.

## INTRODUCTION

The ability to convince students to assume the risk of learning a trade, or more accurately, the ability to "realize the information they have obtained through employment," is what determines the effectiveness of education in formal institutions of higher learning. The field of physical education stands out when compared to others. Education may have an impact on children's psychosocial and cognitive development. This effect will cause the child to develop

smarts and wisdom. Educational initiatives that encourage students to have active lives have an impact on the social environment. Physical education is a crucial strategy for improving schoolchildren's physical activity levels and for promoting public health (Araki et al., 2016). In general, physical activity is very good for physical health. Today, a lot of individuals understand the need of exercise in maintaining a healthy, fit physique. Regular exercise will enhance one's health and wellbeing on a spiritual level (Yasue et al., 2019). Rhythm is one of the sports covered in the high school Physical Education curriculum. In addition to being a fun and educational activity, gymnastics can also help with fitness (Ai, 2018). Gymnastics is a fantastic approach to increase students' muscle and functional fitness as well as their mobility (Sano & Kokudo, 2017).

Teachers and students must work well together to learn by harnessing and incorporating innovation into the process of teaching and learning (Daar & Nasar, 2021). Additionally, developing habits that promote physical health in the form of physical fitness, mental health, and social health is part of healthy living skills education, which is an essential component of life (Nyberg & Larsson, 2014). Motor skills must be developed because they do not develop naturally with age (Ulfah et al., 2021). It seems that a healthy body is considered a presupposition or Sine Quanom Condition, which is a "perfect human," according to the Roman life motto, "In a strong body there is a healthy spirit". In connection with the two components of a healthy body, a strong, healthy soul is also present. Physical fitness is the capacity to complete everyday tasks without becoming overly exhausted and still having the energy to enjoy leisure activities. Contrarily, attention is the conscious processing of a little amount of the vast amount of information that is available. Sensation, memory, cognition, intuition, emotion, and other cognitive processes are used to gather information in addition to the five senses (Indrayogi et al., 2021).

Individuals are tested in rhythmic gymnastics not just in terms of their physical fitness and strength, but also in their capacity to use and improve their motor coordination. Each player must have skill and memory in this sport in order to succeed. All forms of gymnastics benefit those who practice them and, if done frequently, can have a positive impact on physical health. The term "sport that knows no age" refers to rhythmic gymnastics, which can be practiced by people of all ages, including children, teenagers, adults, women, and men. Children and teenagers require physical activity that is fun, developmentally appropriate, and constantly varies. This means kids should engage in physical activity for at least 60 minutes each day (Febriyanti et al., 2018). Exercises with rhythm are beneficial for increasing physical fitness as well as for unwinding and perspiring (Rosidah, 2013).

Aiming to improve and maintain other goals, such as physical fitness and weight loss, rhythmic gymnastics is an activity (sport) performed by individuals or groups of people that uses large muscles, utilizes the rhythm energy system, and follows the rhythm of music (Siska, 2020). All muscles, especially big ones, move smoothly, continuously, rhythmically, forward, and continuously during rhythm training (Listyarini, 2015). Rhythmic gymnastics is a topic that needs to be discussed with pupils in physical education. Students must comprehend and be able to practice rhythmic gymnastics techniques, even when they are still at a basic technical level. In this model, the outputs of problem solving can be used scientifically for both theoretical and practical goals (Umam & Jiddiyyah, 2020). The difficulty of converting the face-to-face learning system to virtual face-to-face necessitates the investigation of efficient ways to meet the intended learning objectives (Nugraha et al., 2021).

According to preliminary research done at several high school/vocational schools in the Majalengka City region, including SMAN 1 Majalengka, SMAN 2 Majalengka, SMK Korpri, SMKN 1 Majalengka, and SMA PGRI 1 Majalengka, students are still unable to master rhythmic gymnastics movements. This is due to a lack of interest in participating in rhythmic gymnastics learning activities and ineffective teaching techniques(Ai, 2018). One illustration is how challenging it is even when pupils follow the step pattern in motion. Then, not all students can perform certain hand motions and match their movements to the beat of the song. In this regard, the researcher hopes to discover a solution, specifically the project-based learning model, so that students may comprehend and master the fundamental techniques in rhythmic gymnastics (Mioduser & Betzer, 2008).

Around the world, project-based learning (PBP) has been used as a component of educational curricula, and it is now a crucial part of integrated curricula (Edmunds et al., 2017). This instructional method promotes critical thinking while enhancing students' communication skills. Numerous investigations carried out in numerous countries throughout the world have demonstrated this. The use of PBP feedback and planning approaches to provide tools for these strategies' analysis and evaluation are currently up for dispute(Masek & Yamin, 2011). It's crucial to consider the feedback process as well. The ability of students to provide feedback on PBP sessions should be taught.

The success of learning in actual practice can be hampered by a number of circumstances, yet practice does play a part in the formation of personality (Daar & Nasar, 2021). In order to develop students' affective, cognitive, and psychomotor skills, Ulfah et al., (2021) developed the project-based learning (PBP) learning paradigm (Huysken et al., 2019). The emphasis of learning is on student activities that produce goods by putting analytical, creativity, and presenting abilities acquired via experiential learning (Veselov et al., 2019). For students, this learning approach offers a tremendous chance as an experience in learning, making the learning process more engaging and enthusiastic (Chen et al., 2021).

Project-based learning (PBP), according to Bell (2010), gives students the opportunity to choose their own collaborative learning and necessitates that they be able to contribute a variety of ideas for project creation based on the knowledge that they already possess (Juliantine et al., 2020). Hasni et al. (2016) start the implementation of PBP learning with key questions, specifically those that can give students tasks for carrying out an activity. Project-based learning is one of the adjustments and innovations in educational activities being used to enhance students' capacity for original thought and problem-solving (Issa et al., 2014).

Collaboration between teachers and students is practiced during planning (Asad et al., 2015). Planning includes knowing the rules of the game, choosing activities that can help in addressing crucial questions, integrating a variety of potential materials, and being aware of the resources available to help a project get done. Teachers and students work together to create a calendar of tasks for finishing assignments (Quennerstedt, 2019). By assisting pupils in each procedure, monitoring is accomplished. Assessment is done to help teachers gauge how well students have mastered competency requirements, to evaluate each student's development, to give feedback on the depth of their comprehension, and to help teachers plan the subsequent learning strategy. Based on theoretical evaluations of the advantages of project-based learning approaches carried out by several earlier specialists or academics. The researchers believed that the project-based learning model could successfully complete what they experienced, along with the empirical investigation of rhythmic gymnastics learning that was mentioned in the previous paragraph.

The learning outcomes for step patterns and hand movements in rhythmic gymnastics all contribute to the achievement of increasing students' motor abilities. In this study, the improvement of motor learning is emphasized more through the appearance and performance of rhythmic gymnastics for new hand motions and step patterns. The focus of this research is on the orientation of learning results in the form of students' motor abilities in rhythmic gymnastics for the pattern of steps and hand movements of stretcher researchers.

## METHOD

A quasi-experimental approach was used in this procedure. The quantitative technique Masyn (2013), of which the quasi-experimental method is a subset, has its own distinctive features, including the use of the same group and the comparison of test results before and after special treatment (DeCuir–Gunby, 2011). Pre- and posttest group designs were used. The sample was 50 students in class XI at SMA PGRI 1 Majalengka. 25 students from SMA PGRI 1 Majalengka were selected as the sample using the purposive sampling method. The author utilized the following evaluation criteria for the research instrument: (1) recording the value of each participant's aspect; (2) adding the values of each participant's aspect; and (3) developing an evaluation standard on a scale of 1–10 (Table 1). The researcher employed observations made during class instruction and descriptive analysis of the data in order to respond to the questions

and hypotheses put forth. Afterward, normality, homogeneity, and hypothesis testing were examined.

**Table 1. Indicators/criteria for movement assessment**

| No. | Indicator/criteria | Value |
|---|---|---|
| 1 | Perfect | 10 |
| 2 | Almost perfect | 9 |
| 3 | Well | 8 |
| 4 | Pretty good | 7 |
| 5 | Not good | 6 |
| 6 | Still not enough | 5 |
| 7 | Not much | 4 |
| 8 | Very less | 3 |
| 9 | Bad | 2 |
| 10 | Very bad | 1 |

## RESULT

Generally speaking, the steps of the project-based learning process are planning, carrying out, and evaluating. Finding project subjects or topics, creating project completion processes, and creating a project timetable are all included in the preparatory stage. Activities that the teacher facilitates and supervises as part of the project completion process are included in the implementation phase. The creation of reports and the presentation or publication of project outcomes come next. The process and outcomes of project activities are evaluated during the evaluation stage (see Table 2 and Table 3).

**Table 2. Pre-test data of students' rhythm gymnastics motion assessment**

| No | Name | Assessment Criteria | | | Total Value |
|---|---|---|---|---|---|
| | | Step Pattern | Hand Movements | Coordination | |
| 1 | Student 1 | 5 | 6 | 6 | 17 |
| 2 | Student 2 | 5 | 5 | 5 | 15 |
| 3 | Student 3 | 5 | 4 | 4 | 13 |
| 4 | Student 4 | 5 | 5 | 5 | 15 |
| 5 | Student 5 | 4 | 4 | 4 | 12 |
| 6 | Student 6 | 5 | 5 | 5 | 15 |
| 7 | Student 7 | 6 | 5 | 6 | 17 |
| 8 | Student 8 | 4 | 5 | 5 | 14 |
| 9 | Student 9 | 6 | 5 | 5 | 16 |
| 10 | Student 10 | 6 | 6 | 7 | 19 |
| 11 | Student 11 | 6 | 6 | 6 | 18 |
| 12 | Student 12 | 4 | 5 | 5 | 14 |
| 13 | Student 13 | 5 | 6 | 5 | 16 |
| 14 | Student 14 | 5 | 6 | 6 | 17 |
| 15 | Student 15 | 6 | 6 | 6 | 18 |
| 16 | Student 16 | 6 | 5 | 5 | 16 |
| 17 | Student 17 | 6 | 5 | 4 | 15 |
| 18 | Student 18 | 6 | 6 | 6 | 18 |
| 19 | Student 19 | 6 | 6 | 6 | 18 |
| 20 | Student 20 | 6 | 4 | 5 | 15 |
| 21 | Student 21 | 5 | 5 | 6 | 16 |
| 22 | Student 22 | 6 | 5 | 5 | 16 |
| 23 | Student 23 | 6 | 6 | 4 | 16 |
| 24 | Student 24 | 5 | 4 | 6 | 15 |
| 25 | Student 25 | 6 | 5 | 6 | 17 |
| | | | Mean | | 15,93 |

**Table 3. Post test data of students' rhythm gymnastics motion assessment**

| No | Name | Assessment Criteria | | | Total Value |
|---|---|---|---|---|---|
| | | Step Pattern | Hand Movements | Coordination | |
| 1 | Student 1 | 6 | 7 | 6 | 19 |
| 2 | Student 2 | 6 | 8 | 6 | 20 |
| 3 | Student 3 | 6 | 7 | 7 | 20 |
| 4 | Student 4 | 6 | 6 | 6 | 18 |
| 5 | Student 5 | 6 | 6 | 6 | 18 |
| 6 | Student 6 | 6 | 6 | 6 | 18 |
| 7 | Student 7 | 6 | 6 | 6 | 18 |
| 8 | Student 8 | 6 | 6 | 6 | 18 |
| 9 | Student 9 | 6 | 7 | 7 | 20 |
| 10 | Student 10 | 7 | 6 | 7 | 20 |
| 11 | Student 11 | 6 | 6 | 6 | 18 |
| 12 | Student 12 | 6 | 7 | 7 | 20 |
| 13 | Student 13 | 6 | 6 | 6 | 18 |
| 14 | Student 14 | 7 | 6 | 6 | 19 |
| 15 | Student 15 | 6 | 6 | 6 | 18 |
| 16 | Student 16 | 6 | 6 | 6 | 18 |
| 17 | Student 17 | 6 | 6 | 6 | 18 |
| 18 | Student 18 | 7 | 6 | 6 | 19 |
| 19 | Student 19 | 7 | 6 | 6 | 19 |
| 20 | Student 20 | 6 | 6 | 6 | 18 |
| 21 | Student 21 | 6 | 6 | 6 | 18 |
| 22 | Student 22 | 6 | 7 | 7 | 20 |
| 23 | Student 23 | 8 | 6 | 7 | 21 |
| 24 | Student 24 | 7 | 6 | 6 | 19 |
| 25 | Student 25 | 7 | 7 | 6 | 20 |
| | | Mean | | | 18.88 |

The following step patterns are available: S step, square step, zigzag step, triangular step, U or horseshoe step. Currently hand movements: arm swing, flexex, butterfly or open the window, chest press, bicep curl, and shoulder press. Coordination step and Hand Movements. The implementation of activities used in schools in this study took the form of rhythmic gymnastics assessments, and the research's primary focus was on hand-eye coordination and step patterns. The outcomes of computing the mean, standard deviation, and variance for each sample group were determined from the tasks that had been completed as can be seen in the Table 4.

The authors also tested the normality of the two sample groups. The method to be employed in evaluating the relevance of the data will be established by this test. A parametric technique is employed if the results of the normality test computation are normally distributed. The results of the calculation for the normalcy test are shown in the Table 5. The experimental group's $F_{count}$ for rhythmic gymnastics was 1.72, and its $F_{table}$ was 2.48, as shown in Table 6. It may be inferred from the homogeneity test findings in Table 6 that the sample group was drawn from a homogeneous population. The t distribution method is used in the following test.

**Table 4. Mean, standard deviation and variance**

| | Average | Standar Deviation | Variance |
|---|---|---|---|
| Pre Test | 15.93 | 1.83 | 3.35 |
| Post Test | 18.88 | 2.40 | 5.78 |

**Table 5. Normality test**

| Test Period | Lo | $L_{table}$ (0,05) | Concluison |
|---|---|---|---|
| Pre Test | 0.1292 | | Normal |
| Post Test | 0.0299 | 0.220 | Normal |

**Table 6. Homogeneity test**

| Ability | $F_{count}$ | $F_{table}$ (0,05) | Conclusion |
|---|---|---|---|
| Rhythmic Gymnastics | 1.72 | 2.48 | Homogeneous |

**Table 7. Hipotesis Test**

| Component | $t_{count}$ | $t_{table}$ 0,05 |
|---|---|---|
| Rhythmic Gymnastics | 7.89 | 2.14 |

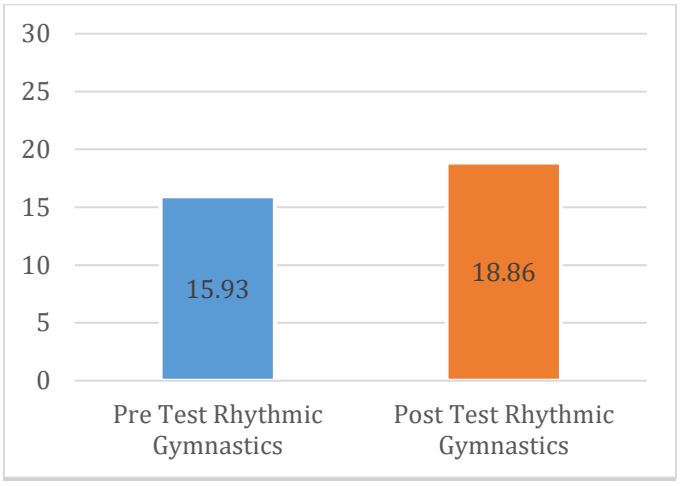


**Figure 1. Improvement of students' motor skills**

Based on the outcomes of evaluating the hypothesis using the t (1–12) criteria for acceptance and rejection, dk (n-1), the critical threshold for accepting or rejecting the hypothesis is therefore t (0.975:14) = 2.14. t (7.89) > t table 0.05 as a result (2.14) (see Table 7). The hypothesis (Ho) is then disproved. Therefore, it can be said that learning through a project-based approach has an effect on enhancing rhythmic gymnastics' fundamental motor motions for step patterns and hand movements. The improvement in students' motor abilities for hand movements and step patterns for the initial and final examinations is shown in the Figure 1.

## DISCUSSION

This study examined the effectiveness of a project-based learning approach in helping high school students at PGRI 1 Majalengka develop their rhythmic gymnastics step patterns and hand movements. According to the outcomes of data processing and analysis, students' ability to perform rhythmic gymnastics motions for step patterns and hand movements improved using the PBP model. This is so that students can collaborate in teams to complete tasks or projects during teaching and learning activities (Bilgin et al., 2015). The teaching and learning processes are combined in this activity-based learning through the cooperation of many teams (Almulla, 2020). Students' creativity and willingness to study can both grow thanks to this teaching strategy (Casey & MacPhail, 2018). Students are expected to look for issues and come up with their own solutions using the PBP model (Oriza Candra, 2021).

The PBP model creates a procedure in which students are in charge of the outcomes of their work, hold themselves accountable, and provide information about the activities they have completed, resulting in a product that is useful for the students themselves and which is later shared with the class (Barron et al., 1998). Consequently, while implementing the PBP paradigm in physical education classes and learning activities, students can also know and grasp the fundamental movements of step patterns and hand movements thanks to the enthusiasm for learning in teams demonstrated by rhythmic gymnastics material utilizing rhythm (Indrawathi, 2020).

The findings of this study support studies that indicates the PBP strategy can enhance high-level skills (Mayasari et al., 2016). Teachers who understand the value of education in meeting

contemporary needs in the age of the global economy will make an effort to give their students the skills required for the 21st century. In order for students to achieve and survive in the increasingly intense competition of the globalization period, based on a study by (Kizkapan & Bektas, 2017), Projects that boost students' motivation and metacognitive thinking abilities should be developed in order to maximize the potential of PBP. In creating PBP, teachers should also receive assistance. Teachers should also receive in-service training based on PBP. According to the study's findings, teachers appear to understand PBP and its advantages in general (Haatainen & Aksela, 2021). The assessment or critique and revision phases, for instance, seem to be missing from even engaged teachers who freely share their work and take part in contests.

The outcomes also confirm and complement earlier findings regarding the difficulties teachers have when using PBP. In conclusion, this research confirms findings from earlier studies, namely that it can enhance learning outcomes despite varying specifications for research variables, samples, infrastructure assistance, and research implementers. According to research findings, the main benefit of project-based learning models is that they can boost students' motivation and metacognitive thinking abilities, enabling them to respond to instructor instructions promptly and complete group projects. Project-Based Learning Model (PBP), which places emphasis on the process of finishing scientifically challenging projects (Juliantine et al., 2020).

Interesting activities are a crucial component that must be present in the classroom learning process. This is due to the fact that engaging in learning activities is the major strategy teachers employ to prepare their pupils to participate fully in the educational process (Ulya et al., 2020). The five steps of project-based learning include problem formulation, problem analysis, learning problem, finding and reporting, solution presentation and reflection, and summing up, integrating, and evaluating. Motor skills must be developed because they do not develop naturally with age (Ocak & Uluyol, 2010). Children's physical and motor development typically follows a similar pattern, making it easy to determine whether it is typical or encountering difficulties (Fernhall et al., 2015). But since each child develops at a different rate, no two persons are exactly same in terms of both physical growth and motor development. Because motor development depends on the maturity of muscles and nerves, children who are not yet mature will find it difficult to display some skills (Barron et al., 1998).

Since cooperation between teachers and students as well as students and students is required to perform this activity, it appears from the explanation above that learning utilizing PBP has a very high level of student activity in order to improve the basic movement abilities, step patterns, and hand motions in order to achieve the learning objectives in the rhythmic gymnastics course. According to Bilgin et al. (2015), whereas no other teacher traits can be consistent with student achievement, teachers' views on their own abilities to instruct have an effect on their students' performance. In accordance with the results of the research that have been done, students are taught to develop their thinking and construct new information in relation to existing knowledge within the context of the surrounding environment, helping students to more clearly grasp what they are doing. According to Quennerstedt (2019), Physical activity that encourages the development of future experiences and incorporates educational elements is known as educational physical activity. As a result, a teacher must exert their full effort to ensure that the learning objectives are met (Indrayogi, 2021).

With this PBP model, the teacher facilitates and ensures smoothness in the teaching and learning activities. The implications and recommendations of this study's findings for teachers are that they must prepare learning models that are in accordance with environmental conditions, student conditions, and existing infrastructure. They must also be able to adapt to the current pandemic conditions. The results of this study imply that the constructed learning environment places pressure on students' efforts to complete projects and encourages the development of more frequent information sharing. In order to boost motivation and learning results, students must be able to take full advantage of teacher instruction using the PBP model, which emphasizes learning activities in teams or groups (Lazić et al., 2021)

## CONCLUSION

The study's findings support the hypothesis that, with the project-based learning paradigm (PBP), students are better able to do rhythmic gymnastics movements for the pattern of steps and hand movements than they were able to do before. In this instance, the researcher advises all stakeholders, particularly teachers, to employ learning models that meet students' requirements, with this project-based learning model undoubtedly being one option. Indeed, this research still has several flaws, which will become the focus of additional research using sample circumstances and different learning models.

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