



The Effectiveness of SAIH Gymnastics in Improving Elementary School Students' Creative Thinking Skills

Nopriana Wulan Sari Ningrum^{1A-E*}, Atri Widowati^{2B-D}, Mhd. Usni Zamzami Hasibuan^{3B-D}, Yonifia Anjanika^{4B-D}

^{1,2,3,4} Universitas Jambi, Jambi, Indonesia

nwulan761@gmail.com^{1*}, atri.widowati@unja.ac.id², zamzamihsb16@unja.ac.id³,
yonifia.anjanika@unja.ac.id⁴

ABSTRACT

The development of creative thinking skills is an essential component of 21st-century education, as students are expected not only to master knowledge but also to generate innovative ideas and solve problems creatively. However, learning practices in elementary schools often emphasize cognitive achievement while paying less attention to the integration of physical activity and creative thinking development. Physical Education (PJOK), through movement-based learning, has the potential to stimulate students' cognitive processes, particularly creativity. Therefore, this study aimed to determine the effectiveness of SAIH (Senam Anak Indonesia Hebat) gymnastics in improving the creative thinking skills of sixth-grade students at MIS Nurul Yaqin. This research employed a quantitative approach using a one-group pretest-posttest experimental design. The research sample consisted of sixth-grade students at MIS Nurul Yaqin selected through a total sampling technique. The instrument used to measure students' creative thinking skills was developed based on Torrance's creativity indicators, which include fluency, flexibility, originality, and elaboration. Data analysis was conducted through descriptive statistics, followed by the Shapiro-Wilk normality test and paired sample t-test to examine the significance of differences between pretest and posttest scores. The results indicated that students' creative thinking skills improved significantly after participating in SAIH gymnastics activities. The average posttest score was higher than the pretest score, showing a substantial improvement in students' creativity indicators. Furthermore, the paired sample t-test produced a significance value of $p < 0.05$, indicating that the increase in scores was statistically significant. In conclusion, the implementation of SAIH gymnastics proved effective in enhancing elementary school students' creative thinking skills. The integration of rhythmic movement, coordination, and exploratory physical activities can provide meaningful learning experiences that stimulate students' creativity and cognitive engagement in Physical Education learning.

ARTICLE HISTORY

Received: 2026/02/24

Accepted: 2026/02/26

Published: 2026/02/28

KEYWORDS

Creative Thinking Skills;

Physical Education;

SAIH Gymnastics;

Elementary School Students;

Movement-Based Learning.

AUTHORS' CONTRIBUTION

A. Conception and design of the study;

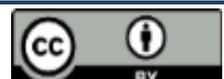
B. Acquisition of data;

C. Analysis and interpretation of data;

D. Manuscript preparation;

E. Obtaining funding

Cites this Article : Ningrum, N.W.S.; Widowati, A.; Hasibuan, M.U.Z.; Anjanika, Y. (2026). The Effectiveness of SAIH Gymnastics in Improving Elementary School Students' Creative Thinking Skills. **Competitor: Jurnal Pendidikan Kepeleatihan Olahraga**. 18 (1), p.1870-1885



INTRODUCTION

Education in the 21st century requires students not only to acquire knowledge but also to develop higher-order thinking skills (HOTS) that enable them to adapt to complex and rapidly changing social environments. These competencies include critical thinking, creativity, communication, and collaboration, which are widely recognized as essential components of modern education systems (Trilling & Fadel, 2016; OECD, 2019). Among these competencies, creative thinking plays a crucial role because it enables learners to generate novel ideas, explore multiple problem-solving alternatives, and respond adaptively to new situations (Runco & Acar, 2017; Beghetto & Kaufman, 2020). In the context of elementary education, creative thinking is considered a foundational cognitive ability that supports lifelong learning and innovation-oriented problem solving (Gafour & Gafour, 2020; Rosiana & Lestari, 2024).

Creative thinking is generally defined as the ability to produce ideas that are both original and useful through processes of divergent thinking, imagination, and flexible reasoning (Runco & Jaeger, 2019). This cognitive ability is closely related to students' capacity to generate multiple responses to a problem, interpret experiences in novel ways, and elaborate ideas into meaningful solutions (Torrance, 2018; Guilford, 2017). However, creativity does not emerge spontaneously; rather, it develops gradually through learning experiences that encourage exploration, experimentation, and intellectual freedom (Munandar, 2021).

At the elementary school level, the development of creative thinking skills becomes particularly important because students are in the transition phase from concrete operational thinking toward more abstract reasoning abilities (Piagetian developmental framework). During this period, children begin to connect physical experiences with conceptual understanding, making experiential learning activities essential for cognitive development (Sawyer, 2017; Craft, 2018). If students are not provided with opportunities to explore ideas and express creativity during this stage, their creative potential may remain underdeveloped. Therefore, educators are encouraged to design learning environments that stimulate imagination, allow students to experiment, and support the development of flexible thinking processes (Munandar, 2021; Henriksen et al., 2019).

One subject that holds significant potential for fostering creative thinking is Physical Education, Sports, and Health (PJOK). Unlike traditional classroom instruction, PJOK learning integrates movement-based experiences with cognitive engagement, allowing students to learn through physical exploration and interaction with the environment (Bailey et al., 2018; Pesce et al., 2021). Through movement activities, students not only develop motor skills and physical fitness but also engage in decision-making, problem-solving, and social collaboration, which are important elements in the development of creative thinking (Lakes & Hoyt, 2019; Diamond & Ling, 2019).

From a theoretical perspective, the connection between physical activity and cognitive development can be explained through the concept of embodied cognition, which suggests that cognitive processes are deeply rooted in bodily interactions with the environment (Wilson, 2002; Foglia & Wilson, 2013). According to this theory, thinking is

not solely a mental activity but a distributed process involving sensory experiences, motor actions, and environmental interactions. Consequently, movement-based learning activities can stimulate cognitive processes such as creativity, imagination, and flexible thinking (Barsalou, 2016; Glenberg & Hayes, 2016).

In educational contexts, research has demonstrated that physical activity can enhance divergent thinking, which is a core component of creativity. Divergent thinking involves generating multiple ideas or solutions to a problem and is commonly measured through indicators such as fluency, flexibility, originality, and elaboration (Torrance, 2018; Runco & Acar, 2017). Empirical studies indicate that students who engage in exploratory movement activities show higher levels of cognitive flexibility and creative idea generation compared to those involved in purely sedentary learning environments (Oppezzo & Schwartz, 2014; Ifalahma & Retno, 2023; Donnelly et al., 2017).

Despite the growing recognition of creativity as a key educational objective, many elementary school learning environments still emphasize memorization and procedural knowledge rather than creative exploration (Henriksen et al., 2019; Beghetto & Kaufman, 2020). This condition is also reflected in physical education practices where activities often focus primarily on physical fitness and basic motor skills without explicitly integrating cognitive or creative dimensions. As a result, the potential of physical education as a medium for developing higher-order thinking skills remains underutilized.

Recent studies highlight the role of movement-based learning in enhancing cognitive development and creative thinking. Physical activity has been shown to stimulate brain regions associated with executive function, memory, and creativity, thereby supporting students' ability to think divergently and solve problems creatively (Diamond & Ling, 2019; Pesce et al., 2021). Activities that combine rhythm, coordination, and improvisational movement are particularly effective in fostering creativity because they require students to adapt movements, interpret patterns, and generate new motor responses (Lakes & Hoyt, 2019; Tomporowski et al., 2020).

In physical education contexts, rhythmic and expressive movement activities such as dance, gymnastics, and creative movement programs have been reported to significantly improve students' cognitive flexibility and creative expression (Koutsouba et al., 2019; Ruin et al., 2021). These activities allow learners to experiment with body movements, interpret musical rhythms, and develop unique movement patterns, which indirectly stimulate creative thinking processes (Schmidt et al., 2017; Torrents et al., 2020). One movement program that aligns with these characteristics is SAIH Gymnastics (Senam Anak Indonesia Sehat), a national initiative introduced by the Ministry of Youth and Sports of the Republic of Indonesia. SAIH Gymnastics combines rhythmic movement, coordination, and artistic expression in a sequence of simple and dynamic exercises designed specifically for children. The program aims to promote physical fitness, motor development, and enjoyment in physical activity among elementary school students (Kemenpora, 2022).

From a pedagogical perspective, SAIH Gymnastics offers learning experiences that involve rhythm, spatial awareness, coordination, and expressive movement. These

elements encourage students to engage actively in movement exploration and interpretation, which may stimulate creative thinking processes. Furthermore, the dynamic and enjoyable nature of the exercises makes them suitable for elementary school students who naturally learn through play and movement exploration (Bailey et al., 2018; Pesce et al., 2021).

Although previous studies have widely documented the benefits of physical activity for cognitive development, most research has focused primarily on physical fitness outcomes, executive function, or academic achievement (Donnelly et al., 2017; Diamond & Ling, 2019). Studies specifically examining the relationship between structured gymnastics programs and creative thinking skills in elementary school students remain relatively limited, particularly within the context of Indonesian physical education. In addition, many PJOK learning practices in elementary schools still emphasize teacher-centered instruction in which students imitate predetermined movement patterns rather than exploring or creating new movements. Such instructional approaches limit opportunities for divergent thinking and reduce the potential of movement activities to foster creativity (Henriksen et al., 2019; Ruin et al., 2021).

Preliminary observations conducted at MIS Nurul Yaqin indicate that PJOK learning activities tend to focus mainly on improving students' physical fitness and mastering basic movement techniques. Gymnastics activities are usually implemented as routine exercises without integrating opportunities for creative movement exploration. Consequently, students often follow teacher instructions passively without being encouraged to modify movements or generate their own ideas. This condition suggests a discrepancy between the goals of 21st-century education, which emphasize higher-order thinking skills, and the implementation of PJOK learning practices in schools. Therefore, empirical research is needed to explore how innovative movement programs such as SAIH Gymnastics can be utilized not only to enhance physical fitness but also to promote creative thinking skills among elementary school students.

Based on the aforementioned background, this study aims to examine the effectiveness of SAIH Gymnastics in improving the creative thinking skills of elementary school students. Specifically, the study investigates how participation in SAIH Gymnastics activities influences students' creative thinking indicators, including fluency, flexibility, originality, and elaboration, as conceptualized in Torrance's creativity framework. The novelty of this research lies in integrating movement-based physical education with creative thinking development through the application of SAIH Gymnastics. While previous studies have largely examined physical activity in relation to fitness or cognitive performance, this research focuses specifically on the role of a national gymnastics program as a pedagogical intervention to enhance creative thinking in elementary education.

Furthermore, the study contributes to the development of innovative PJOK learning strategies by demonstrating how movement-based activities can simultaneously support physical, cognitive, and affective development. By empirically examining the effectiveness of SAIH Gymnastics in the context of elementary school

education, this research is expected to provide evidence-based recommendations for integrating creative thinking development into PJOK curricula. In conclusion, this study is expected to strengthen the theoretical and practical understanding of how embodied learning approaches can foster creative thinking in children. The findings may also support the development of more innovative and holistic physical education programs that align with the demands of 21st-century education, which emphasize creativity, innovation, and active student participation in the learning process.

METHODS

This study employed a quantitative experimental approach using a one-group pretest-posttest design to examine the effectiveness of SAIH Gymnastics in improving elementary school students' creative thinking skills. The experimental design was selected because it allows researchers to measure changes in participants' cognitive abilities before and after the implementation of an intervention, thereby enabling the evaluation of causal effects within a controlled educational setting (Creswell & Creswell, 2018; Fraenkel et al., 2019). In this design, students' creative thinking skills were measured at two different stages: before the intervention (pretest) and after the intervention (posttest). The difference between the two measurements served as the primary indicator of the effectiveness of the SAIH Gymnastics program in stimulating creative thinking development. Experimental designs of this type are widely used in educational research to evaluate the impact of instructional interventions on students' cognitive outcomes (Johnson & Christensen, 2020; Thomas et al., 2022).

The participants of this study consisted of sixth-grade students at MIS Nurul Yaqin, who served as the experimental group. The selection of participants was based on the consideration that students at this stage of elementary education are transitioning from concrete operational to more advanced cognitive thinking stages, making them particularly receptive to learning experiences that stimulate creativity and divergent thinking (Craft, 2018; Sawyer, 2017). In total, the class consisted of students who regularly participated in Physical Education, Sports, and Health (PJOK) lessons, ensuring that the intervention could be integrated naturally within the existing curriculum. Prior to the research implementation, students were given an explanation regarding the objectives and procedures of the study, and permission was obtained from the school to conduct the research activities in accordance with ethical standards for educational research (Cohen et al., 2018).

The intervention implemented in this study was SAIH Gymnastics (Senam Anak Indonesia Sehat), a movement-based physical activity program designed for children and developed as part of Indonesia's national physical activity initiative. The SAIH Gymnastics program integrates rhythmic movements, coordination exercises, and dynamic motor patterns that encourage students to actively engage with their bodies and explore movement variations. From the perspective of embodied learning theory, physical movement can stimulate cognitive processes because bodily actions and sensorimotor

experiences are closely related to how individuals process information and generate ideas (Barsalou, 2016; Wilson & Golonka, 2019). During the intervention period, SAIH Gymnastics activities were incorporated into PJOK learning sessions, allowing students to follow movement patterns, adapt them to rhythm, and explore creative variations of movement. Such movement exploration activities are known to encourage divergent thinking and cognitive flexibility among children (Pesce et al., 2021; Diamond & Ling, 2019).

To measure students' creative thinking skills, the study employed an instrument based on the creativity indicators proposed by E. Paul Torrance, which include fluency, flexibility, originality, and elaboration. These indicators represent key dimensions of divergent thinking and are widely used in creativity assessment in educational research (Torrance, 2018; Runco & Acar, 2017). Fluency refers to the ability to generate multiple ideas, flexibility reflects the ability to produce diverse categories of ideas, originality indicates the uniqueness of ideas generated, and elaboration refers to the ability to expand or refine ideas in detail. Prior to its implementation, the instrument underwent validity and reliability testing to ensure that it accurately measured the intended constructs. Content validity was assessed through expert judgment involving physical education and educational psychology experts, while reliability testing was conducted using internal consistency analysis to confirm the stability of the instrument (Cohen et al., 2018; Johnson & Christensen, 2020).

Data analysis was conducted in several stages using statistical procedures appropriate for experimental research. First, descriptive statistics were used to summarize and describe the characteristics of the data obtained from the pretest and posttest results. Descriptive analysis included calculations of the mean, standard deviation, and percentage distribution to provide an overview of students' creative thinking performance before and after the intervention (Field, 2018). Second, a Shapiro-Wilk normality test was conducted to determine whether the data distribution met the assumptions required for parametric statistical testing. The Shapiro-Wilk test is commonly recommended for small to moderate sample sizes and provides a reliable assessment of data normality in educational studies (Razali & Wah, 2016; Mishra et al., 2019).

Finally, to examine whether there was a significant difference between pretest and posttest scores, hypothesis testing was conducted using a paired sample t-test. This statistical test is appropriate for comparing two related measurements obtained from the same group of participants before and after an intervention (Field, 2018). The paired t-test allows researchers to determine whether the observed changes in creative thinking scores are statistically significant and can be attributed to the implementation of the SAIH Gymnastics program. In this study, the level of statistical significance was set at $\alpha = 0.05$, which is a commonly accepted threshold in educational and behavioral research (Creswell & Creswell, 2018). If the obtained significance value (p-value) was less than 0.05, the intervention would be considered effective in improving students' creative thinking skills.

RESULTS AND DISCUSSION

Result

The results of this study were intended to determine the effectiveness of the implementation of SAIH Gymnastics in improving the creative thinking skills of sixth-grade students at MIS Nurul Yaqin. Data analysis was carried out by comparing the results of students' pretest and posttest scores after the intervention was administered. The collected data were analyzed through descriptive and inferential statistical procedures to determine whether there was a significant improvement in students' creative thinking skills after participating in the SAIH Gymnastics program.

Descriptive Analysis of Pretest Results

The initial measurement of students' creative thinking skills was conducted through a pretest before the implementation of the SAIH Gymnastics intervention. The pretest results showed that the average score of students' creative thinking skills was 40.91, with a standard deviation of 5.90. The highest score obtained by students was 55, while the lowest score recorded was 30. These results indicate that, prior to the intervention, the overall level of creative thinking skills among the students was still relatively moderate and required improvement through appropriate learning strategies.

The distribution of pretest scores based on creative thinking categories is presented in Table 1.

Table 1.
Distribution of Students' Creative Thinking Skills (Pretest)

Category	Frequency	Percentage
Very Good	0	0%
Good	2	8%
Moderate	20	84%
Poor	2	8%
Very Poor	0	0%
Total	24	100%

Based on Table 1, it can be seen that 2 students (8%) were categorized as having good creative thinking skills, while 20 students (84%) were in the moderate category, and 2 students (8%) were categorized as poor. These findings suggest that most students initially demonstrated limited creative thinking abilities, particularly in generating diverse and original ideas during problem-solving tasks.

Descriptive Analysis of Posttest Results

After the implementation of the SAIH Gymnastics intervention, which was conducted for 16 learning sessions, students were given a posttest to measure changes in their creative thinking skills. The posttest results indicated a significant improvement in students' performance. The average score increased to 62.20, with a standard deviation of 5.725. The highest score achieved by students was 70, while the lowest score recorded was 51.

The distribution of posttest scores based on creative thinking categories is presented in Table 2.

Table 2.
 Distribution of Students' Creative Thinking Skills (Posttest)

Category	Frequency	Percentage
Very Good	6	25%
Good	18	75%
Moderate	0	0%
Poor	0	0%
Very Poor	0	0%
Total	24	100%

Table 2 shows that after participating in the SAIH Gymnastics program, 6 students (25%) achieved the very good category, while 18 students (75%) were categorized as good. No students remained in the moderate or poor categories, indicating a clear improvement in the overall level of creative thinking skills among the participants.

Comparison of Pretest and Posttest Scores

A comparison between the pretest and posttest results demonstrates a substantial improvement in students' creative thinking abilities following the intervention. The average score increased from 40.91 in the pretest to 62.20 in the posttest, resulting in an improvement of 21.29 points. This increase indicates that the implementation of SAIH Gymnastics contributed positively to the development of students' creative thinking skills.

The comparison of these results is illustrated in Figure 1, which presents a visual representation of the improvement in students' creative thinking scores.

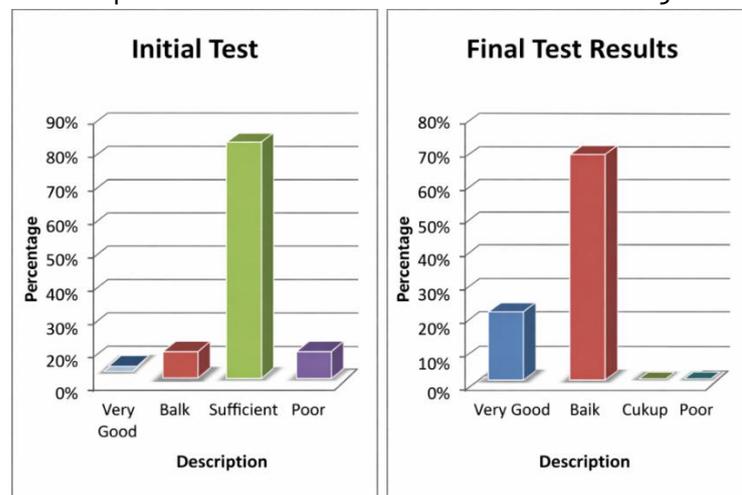


Figure 1.

Diagram of Pretest and Posttest Results

The diagram illustrates the comparison between the mean scores of the pretest and posttest. The figure clearly shows a significant increase in the average score after the implementation of the SAIH Gymnastics program. Visual representation of the data helps readers to easily understand the magnitude of improvement that occurred during the research process.

Furthermore, Figure 2 presents a curve representing the increase in the mean score of students' creative thinking skills.

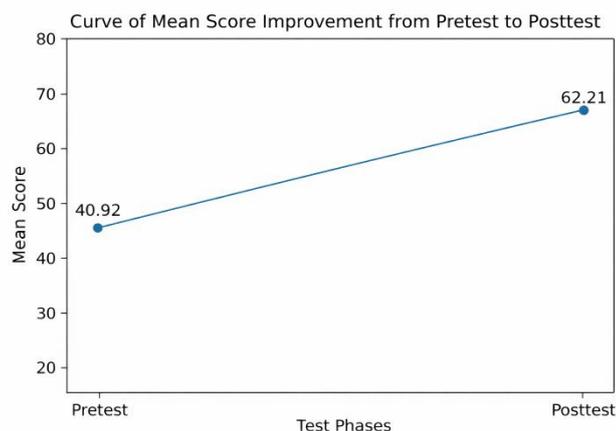


Figure 2.

Curve of Mean Score

The curve shows a noticeable upward trend from the pretest mean score (40.91) to the posttest mean score (62.20). This upward trend indicates that students experienced substantial progress in their ability to generate ideas, demonstrate flexibility in thinking, and elaborate creative responses after participating in the SAIH Gymnastics learning activities.

Inferential Analysis

To determine whether the observed improvement was statistically significant, a paired sample t-test was conducted to compare the pretest and posttest scores. The analysis showed that the posttest mean score was significantly higher than the pretest mean score ($p < 0.05$), indicating that the improvement in students' creative thinking skills after the SAIH Gymnastics intervention was statistically significant.

These findings confirm that the implementation of SAIH Gymnastics as a movement-based learning intervention can effectively enhance elementary school students' creative thinking skills. The results demonstrate that integrating rhythmic movement activities and physical exploration into physical education learning can stimulate cognitive processes associated with creativity, including fluency, flexibility, originality, and elaboration.

Overall, the findings suggest that SAIH Gymnastics is not only beneficial for improving students' physical fitness but also plays an important role in supporting the development of creative thinking skills, which are essential competencies in 21st-century education.

Discussion

The findings of this study demonstrate that the implementation of SAIH Gymnastics significantly improved the creative thinking skills of sixth-grade students at MIS Nurul Yaqin. This improvement was reflected not only in the statistical increase in mean scores between the pretest and posttest but also in the shift in the distribution of student achievement categories, where most students moved from moderate and poor categories to good and very good categories after the intervention. These results indicate that structured and meaningful physical activity, particularly through rhythmic

and exploratory movement programs such as SAIH Gymnastics, can function as an effective medium for enhancing higher-order cognitive abilities among elementary school students. Similar findings have been reported in recent studies indicating that movement-based learning environments can promote creative thinking, cognitive flexibility, and problem-solving abilities in children (Diamond & Ling, 2019; Pesce et al., 2021; Torrents et al., 2020; Ruin et al., 2021).

Conceptually, the results of this study can be interpreted through the framework of embodied cognition, which emphasizes that cognitive processes are deeply intertwined with bodily movement and environmental interaction. According to embodied cognition theory, thinking is not merely a mental process occurring within the brain but rather a dynamic interaction between the brain, body, and environment (Barsalou, 2016; Wilson & Golonka, 2019). In the context of SAIH Gymnastics, students engage in rhythmic movement patterns, coordination tasks, and spatial exploration that require them to actively interpret instructions, adapt their movements, and create variations. Such sensorimotor experiences stimulate cognitive processes associated with creativity, including idea generation, flexible thinking, and imaginative expression. Empirical research also shows that physically active learning environments can significantly improve divergent thinking abilities in children, particularly in the dimensions of fluency and originality (Oppezzo & Schwartz, 2014; Schmidt et al., 2017; Ifalahma & Retno, 2023).

In addition to the embodied cognition perspective, the findings of this study can also be analyzed through Jean Piaget's constructivist theory of learning, which states that children actively construct knowledge through interaction with their environment. According to Piaget, learning occurs through the processes of assimilation and accommodation, in which individuals integrate new experiences into existing cognitive structures and modify those structures when encountering new challenges (Sawyer, 2017; Craft, 2018). In the context of SAIH Gymnastics, students do not merely imitate the teacher's movement instructions; instead, they engage in active experimentation with movement patterns, rhythm, and coordination. When students modify movements, adjust tempo, or create new variations, they are essentially undergoing a cognitive restructuring process that contributes to the development of creativity. Such experiences allow students to develop flexible thinking patterns and innovative responses, which are core characteristics of creative thinking (Runco & Jaeger, 2019; Beghetto & Kaufman, 2020).

Furthermore, the results of this research can also be explained through Lev Vygotsky's sociocultural theory, which emphasizes the importance of social interaction in cognitive development. Vygotsky introduced the concept of the Zone of Proximal Development (ZPD), which describes the distance between what learners can accomplish independently and what they can achieve with guidance or collaboration (Vygotsky, 1978; Daniels, 2016). During SAIH Gymnastics activities, students practice movements collaboratively in groups, observe their peers' performances, and exchange ideas regarding movement variations. This collaborative learning environment allows for scaffolding, where students with higher abilities assist their peers in mastering new

movement patterns. Such interactions encourage students to experiment with new ideas, develop confidence in expressing creativity, and expand their cognitive capabilities. Previous studies have also highlighted the role of cooperative physical education activities in improving students' creativity, collaboration, and communication skills (Bailey et al., 2018; Lakes & Hoyt, 2019; Casey & Goodyear, 2015).

From the perspective of educational neuroscience, the positive impact of SAIH Gymnastics on creative thinking can also be explained by the physiological effects of physical activity on brain function. Research has shown that physical activity increases cerebral blood flow and stimulates the production of brain-derived neurotrophic factor (BDNF), which plays a crucial role in promoting neural plasticity and enhancing cognitive functions (Hillman et al., 2018; Ratey & Loehr, 2018). Enhanced neural plasticity improves executive functions such as working memory, inhibitory control, and cognitive flexibility, which are essential components of creative thinking (Diamond & Ling, 2019; Best, 2017). In this study, the improvement in students' scores in fluency, flexibility, originality, and elaboration may therefore be attributed to the combination of physiological stimulation and cognitive engagement provided by the SAIH Gymnastics program. Movement activities that involve rhythm, coordination, and spatial awareness require continuous mental processing, which stimulates neural pathways associated with creativity and learning (Pesce et al., 2021; Tomporowski et al., 2020).

Another theoretical framework that supports the findings of this research is Self-Determination Theory (SDT) proposed by Ryan and Deci. According to this theory, intrinsic motivation develops when three fundamental psychological needs are fulfilled: autonomy, competence, and relatedness (Ryan & Deci, 2020; Ryan & Deci, 2024). The implementation of SAIH Gymnastics creates learning conditions that fulfill these psychological needs. Students experience autonomy when they are given opportunities to explore and modify movement patterns creatively. They develop a sense of competence when they successfully perform and master the sequence of movements. Additionally, the group-based nature of gymnastics activities fosters relatedness, as students interact, collaborate, and support one another during practice sessions. When these three psychological needs are satisfied, students tend to show higher levels of intrinsic motivation, which encourages them to engage more actively in learning activities and take risks in experimenting with new ideas. Previous studies have shown that intrinsically motivated learners demonstrate higher levels of creativity and cognitive engagement in learning environments (Susanti et al., 2025; Hagger & Chatzisarantis, 2016).

The results of this study can also be interpreted through Howard Gardner's theory of multiple intelligences, particularly bodily-kinesthetic intelligence, which refers to the ability to use the body effectively to express ideas and solve problems (Gardner, 2018). In gymnastics-based learning activities, students utilize their bodily movements to interpret rhythms, coordinate motor patterns, and express creative ideas through motion. This process integrates kinesthetic intelligence with cognitive and emotional processes, resulting in more holistic learning experiences. Physical education activities

that emphasize creative movement and body expression have been shown to support the development of both cognitive and emotional intelligence among children (Bailey et al., 2018; Torrents et al., 2020). Therefore, PJOK learning should not be perceived solely as physical training but rather as an integrative educational medium that develops multiple dimensions of intelligence simultaneously.

In addition, the improvement in students' creative thinking skills observed in this study is consistent with previous empirical research examining the relationship between physical activity and creativity. Studies conducted in various educational contexts have found that rhythmic movement programs, dance-based learning, and creative gymnastics activities can significantly enhance divergent thinking abilities and cognitive flexibility among elementary school students (Koutsouba et al., 2019; Schmidt et al., 2017; Torrents et al., 2020; Ruin et al., 2021). These activities require students to interpret movements, adapt to changing rhythms, and generate novel responses, all of which contribute to the development of creative thinking skills.

Overall, the findings of this study confirm that the enhancement of creative thinking through SAIH Gymnastics occurs as a result of the synergistic interaction between physical stimulation, cognitive engagement, social collaboration, and intrinsic motivation. Movement activities that involve coordination, rhythm, exploration of variations, and group interaction create a constructive learning environment that challenges students to think creatively while engaging physically. This integrated learning approach aligns with the principles of 21st-century education, which emphasize the importance of developing higher-order thinking skills alongside physical and social competencies (OECD, 2019; Trilling & Fadel, 2016).

Therefore, the results of this research suggest that gymnastics-based physical education programs such as SAIH Gymnastics can serve as innovative pedagogical strategies for supporting the development of creative thinking skills among elementary school students. By integrating physical activity with cognitive and social learning processes, PJOK teachers can create more meaningful and holistic learning experiences that foster creativity, motivation, and active participation in the classroom. These findings also highlight the importance of reorienting physical education curricula toward approaches that integrate movement exploration, collaboration, and creative expression in order to support the development of higher-order thinking skills in elementary education.

CONCLUSION

Based on the results of the research and data analysis conducted, it can be concluded that the implementation of SAIH Gymnastics in Physical Education (PJOK) learning significantly improved the creative thinking skills of sixth-grade students at MIS Nurul Yaqin. The effectiveness of the intervention was clearly reflected in the comparison between the pretest and posttest results. The mean score of students' creative thinking skills increased from 40.91 in the pretest to 62.20 in the posttest,

indicating an improvement of 21.29 points after students participated in 16 sessions of SAIH Gymnastics activities. In addition to the increase in mean scores, there were also notable improvements in the distribution of achievement categories. Initially, most students were in the moderate category (84%), with only 8% in the good category and 8% in the poor category. After the intervention, the distribution changed significantly, with 25% of students categorized as very good and 75% categorized as good, indicating a substantial enhancement in students' creative thinking abilities.

The improvement observed in this study occurred across all creativity indicators used in the research instrument, namely fluency, flexibility, originality, and elaboration, which are core dimensions of creative thinking. These findings indicate that structured and exploration-based physical activity, such as SAIH Gymnastics, can function as an effective stimulus for developing creative thinking skills in elementary school students. Through rhythmic movements, coordination exercises, and opportunities to explore variations of movement, students are encouraged to generate new ideas, adapt to different movement patterns, and express creativity through physical activity.

Conceptually, the results of this research reinforce the perspective that Physical Education learning is not limited to the development of physical fitness, but also plays an important role in supporting students' cognitive development, particularly in fostering higher-order thinking skills. SAIH Gymnastics integrates physical movement with cognitive engagement and social interaction, creating a learning environment that is active, enjoyable, and meaningful. This environment encourages students to participate more actively in the learning process, build confidence in expressing ideas, and develop diverse creative movements.

Therefore, the findings of this study suggest that SAIH Gymnastics can be recommended as an innovative learning strategy in Physical Education (PJOK) to support the development of Higher Order Thinking Skills (HOTS) among elementary school students. The integration of structured gymnastics activities into the PJOK curriculum has the potential to promote not only students' physical development but also their creativity, cognitive flexibility, and active engagement in learning. Such an approach aligns with the goals of 21st-century education, which emphasize creativity, innovation, and holistic student development.

ACKNOWLEDGMENTS

The authors would like to express their sincere gratitude to all parties who contributed to the successful completion of this research entitled "The Effectiveness of SAIH Gymnastics in Improving Elementary School Students' Creative Thinking Skills." This study would not have been possible without the support, cooperation, and encouragement from various individuals and institutions who played important roles throughout the research process.

First and foremost, the authors would like to thank the principal and teachers of MIS Nurul Yaqin for granting permission and providing full support during the

implementation of this research. Their openness and cooperation made it possible to conduct the study effectively within the school environment, particularly in integrating the SAIH Gymnastics activities into the Physical Education (PJOK) learning sessions. Special appreciation is also extended to the sixth-grade students of MIS Nurul Yaqin who enthusiastically participated in the research activities. Their active engagement, motivation, and willingness to follow the learning process contributed significantly to the success of the study and the collection of meaningful research data.

The authors would also like to acknowledge the valuable contributions of physical education educators and academic colleagues who provided constructive feedback, suggestions, and insights during the preparation and implementation of this research. Their academic perspectives helped strengthen the research design, improve the data analysis process, and ensure that the study was conducted in accordance with scientific research standards.

Furthermore, the authors appreciate the support from the broader educational and academic community that continues to encourage the development of innovative learning models in Physical Education. The implementation of SAIH Gymnastics as an educational intervention in this research reflects the importance of integrating physical activity with cognitive development, particularly in promoting students' creative thinking skills.

Finally, the authors hope that the findings of this study will contribute to the development of more innovative and meaningful Physical Education learning practices in elementary schools. It is expected that this research will inspire educators, researchers, and policymakers to further explore movement-based learning approaches that support the development of creativity and higher-order thinking skills among students.

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