

The Hybrid Learning System With Project Based Learning: Can It Increase Creative Thinking Skill and Learning Motivation in Physical Education Learning?

El sistema de aprendizaje híbrido con aprendizaje basado en proyectos: ¿puede aumentar la capacidad de pensamiento creativo y la motivación de aprendizaje en el aprendizaje de la educación física?

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Abstract. This research aims to determine the effect of hybrid learning using the project based learning method on creative thinking abilities and learning motivation. The research method is the true experimental research technique, utilizing The Randomized Pretest-Posttest Control Group Design. The population for this study included all students in Senior High School 1 Purwokerto, totaling 1015 students across 36 classes. Simple random sampling was employed to select a total sample of 112 students ($n = 112$, age = 17.1 ± 1.2 years). This research uses two instruments to obtain data, including 1) The Torrance Tests of Creative Thinking (TTCT) and 2) The Motivated Strategies for Learning Questionnaire (MSLQ). The data analysis used was the data normality test, data homogeneity test, paired t-test and independent t-test. The data used is normally distributed ($\text{sig}=0.434$) and homogeneous ($\text{sig}=0.533$), The research results show that the effect of Hybrid Learning with the Project Based Learning method on creative thinking skills and learning motivation ($\text{sig}=0.000$), control group ($\text{sig}=0.002$), and there is a significant difference in effect between the treatment group and the control group ($\text{sig}=0.000$). It can be concluded that 1) PjBL model has a favorable impact on students' critical thinking skills in physical education, 2) PjBL model positively influences learning motivation in physical education, and 3) PjBL model yields a more positive outcome compared to the direct teaching model in enhancing students' creative thinking skills in the context of physical education.

Keyword: Critical Thinking Skills, Hybrid Learning, Learning Motivation, Project Based learning

Resumen. Esta investigación tiene como objetivo determinar el efecto del aprendizaje híbrido utilizando el método de aprendizaje basado en proyectos sobre las habilidades de pensamiento creativo y la motivación para el aprendizaje. El método de investigación es la verdadera técnica de investigación experimental, utilizando el Diseño Aleatorio de Grupos de Control Pretest-Posttest. La población para este estudio incluyó a todos los estudiantes de la Escuela Secundaria Superior 1 Purwokerto, con un total de 1015 estudiantes en 36 clases. Se empleó un muestreo aleatorio simple para seleccionar una muestra total de 112 estudiantes ($n = 112$, edad = $17,1 \pm 1,2$ años). Esta investigación utiliza dos instrumentos para obtener datos, que incluyen: 1) Las Pruebas de Torrance de Pensamiento Creativo (TTCT); 2) El Cuestionario de Estrategias Motivadas para el Aprendizaje (MSLQ). El análisis de los datos utilizado fue la prueba de normalidad de los datos, la prueba de homogeneidad de los datos, la prueba t pareada y la prueba t independiente. Los datos utilizados son normalmente distribuidos ($\text{sig}=0,434$) y homogéneos ($\text{sig}=0,533$), Los resultados de la investigación muestran que el efecto del Aprendizaje Híbrido con el método de Aprendizaje Basado en Proyectos sobre las habilidades de pensamiento creativo y la motivación de aprendizaje ($\text{sig}=0,000$), el grupo control ($\text{sig}=0,002$), y existe una diferencia significativa en el efecto entre el grupo de tratamiento y el grupo control ($\text{sig}=0,000$). Se puede concluir que 1) el modelo PjBL tiene un impacto favorable en las habilidades de pensamiento crítico de los estudiantes en educación física, 2) el modelo PjBL influye positivamente en la motivación de aprendizaje en educación física, y 3) el modelo PjBL produce un resultado más positivo en comparación con el modelo de enseñanza directa en la mejora de las habilidades de pensamiento creativo de los estudiantes en el contexto de la educación física.

Palabra clave: Habilidades de Pensamiento Crítico, Aprendizaje Híbrido, Motivación de Aprendizaje, Aprendizaje Basado en Proyecto

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Introduction

Education in the 21st era emphasizes adaptation to technology and skills. Focus on developing critical thinking, collaboration, and creativity. Technology integration supports flexible and innovative learning. The curriculum accommodates global needs, promotes inclusivity, and prioritizes digital literacy. The teacher acts as a facilitator, encouraging student exploration. Education is oriented towards developing character and the ability to think independently, preparing generations for future challenges (Tan, 2017; Wicaksono et al., 2020). The challenges of education in the 21st era involve effective integration of technology, adapting the curriculum to global needs, and inclusive learning. Developing skills and ensuring equal access to education are critical challenges in preparing generations for the future (Fery et al., 2017; Hadiana et al., 2023; Iyakrus et al., 2022). The learning educational program additionally means to improve the nature of

creative mind and innovativeness; get human qualities, build up one's latent capacity, create basic reasoning, and build up a submitted and dependent individual (Heaviside et al., 2018). The current educational plan requests that understudies should have psychological abilities, capacities in reality, and have a respectable character, and be more dynamic in the learning interaction. In later learning, the instructor as the principal wellspring of data will transform into a more ideal student with genuine and understudy situated problems so understudies can build their insight and be effectively associated with discovering data (Endepohls-Ulpe, 2009; Fery et al., 2017; Lin et al., 2017; Wongdaeng & Hajihama, 2018). Physical education has a crucial role in shaping students' physical and mental development (Khoiriyah & Husamah, 2018). In an ever-changing global era, the challenge of preparing students not only in physical aspects, but also creative thinking skills and learning motivation is becoming increasingly important (Car et al., 2019; Eviyanti et

al., 2017; Khusaini et al., 2018; McBride, 2016). Hybrid Learning System (HLS) with a Project-Based Learning (PJBL) approach promises innovation in physical education teaching (Rahardjanto et al., 2019). This research aims to explore the potential of HLS with PJBL in improving students' creative thinking skills and learning motivation in Physical Education subjects. Physical education is often considered only related to physical activity and health. However, the paradigm shift supports the understanding that physical education must also contribute to the development of students' creative thinking skills and learning motivation (Burgess et al., 2018; Mann et al., 2021; Raiyn, 2016). The main challenge facing physical education is how to integrate these elements without reducing the focus on the essential physical aspects. In the midst of the technological revolution, physical education is also faced with pressure to utilize technology as an effective teaching tool. However, so far, the integration of technology in physical education contexts is still in its infancy, with concerns about negative impacts on more traditional physical activities. Creative thinking skills are an important foundation in facing complex challenges in the modern era (Boa et al., 2018). Physical education that involves creative elements can provide students with opportunities to develop innovative thinking, creative solutions, and adaptability (Chen, 2017; Hitchcock, 2017). Therefore, there is a need for a learning approach that stimulates and supports the development of creative thinking skills in Physical Education subjects (Florea & Hurjui, 2015; Sumartiningasih et al., 2022). Learning motivation has a critical role in ensuring the effectiveness of the learning process. However, often, Physical Education subjects are considered less interesting for some students, which can hinder their learning motivation (Kogoya et al., 2023). Therefore, a learning approach is needed that can increase students' interest and motivation towards learning physical education (Susanto et al., 2023). HLS combines traditional learning approaches with online learning elements. PJBL, on the other hand, emphasizes contextual and collaborative learning through relevant projects. It is hoped that the integration of these two approaches can create a holistic learning environment, combining the advantages of technology with practical learning experiences. At a theoretical level, HLS with PJBL is expected to provide a more interesting learning experience and stimulate the development of creative thinking skills. By involving students in contextual projects, it is hoped that they can link theoretical concepts with practical applications, thereby increasing their understanding. Although there is research that supports the effectiveness of PJBL and HLS in increasing motivation and creative thinking skills, research specific to the implementation of these two approaches in the context of Physical Education is still limited. This knowledge gap provides a strong basis for conducting further research to fill this gap and provide deeper insight into the potential for integrating HLS with PJBL in Physical Education subjects. This research aims to evaluate the impact of using HLS with PJBL in improving students' creative thinking skills and learning motivation in Physical Education subjects. By understanding the contributions of these two approaches, it is hoped that we can provide a more comprehensive view of how technology and project-

based learning can be effectively integrated in the physical education context. The benefits of this research involve contributing to the academic literature by providing empirical evidence about the effectiveness of the HLS approach with PJBL in improving student learning outcomes in Physical Education subjects. In addition, it is hoped that the findings of this research can provide practical guidance for educators and policy makers in designing innovative and relevant learning strategies.

Materials and Methods

Study Design

The research method employed in this investigation is the true experimental research technique utilizing The Randomized Pretest-Posttest Control Group Design. This design incorporates two groups designated as the experimental group and the control group. Both groups undergo measurements at two points: pretest and posttest. The randomization ensures unbiased group assignment, allowing for a robust comparison between the experimental and control groups. This design facilitates the assessment of the intervention's impact by comparing the changes observed in both groups over time, providing valuable insights into the effectiveness of the implemented HLS with PJBL in enhancing creative thinking skills and learning motivation.

Table 1.

The Randomize Pretest-Posttest Control Group

Experimental group	R	O1	X	O2
Control group	R	O1	C	O2

Description:

R: Assignment

O1: an initial test using multiple-choice test and poll questions

O2: Final Test Using multiple-choice test and poll

X: Treatment (Application of project based learning model in PE learning)

C: Conventional Learning

The researchers chose the experimental approach employing the Randomized Pretest-Posttest Control Group Design to assess the impact of the PJBL on creative thinking skills and student motivation in acquiring physical education within the experimental group.

Study Participant

The population for this study included all students in grades X, XI, and XII at Senior High School 1 Purwokerto, totaling 1015 students across 36 classes. Each grade, X and XI, consisted of 12 classes. Simple random sampling was employed to select a total sample of 112 students ($n = 112$, age = 17.1 ± 1.2 years) participation in the study. This sampling method ensures a representative subset of the larger student population, allowing for meaningful analysis and generalization of findings.

Study Procedures

This research uses several instruments to obtain data, including: 1) Torrance Tests of Creative Thinking (TTCT), to measure creative thinking skills, TTCT provides tasks that assess various aspects of creativity, including fluency, diversity of ideas, ability to make comparisons, and transformational thinking; 2) Motivated Strategies for Learning Questionnaire (MSLQ), MSLQ is an instrument that measures student motivation and learning strategies. It includes aspects such as intrinsic

motivation, extrinsic motivation, self-confidence, and learning strategies. The procedures undertaken were as follows: 1) Data Normality Test – Conducted to assess the normality of acquired data, this test aimed to determine the appropriate statistical analysis. The Kolmogorov-Smirnov method was employed for normality assessment. 2) Homogeneity Test – Executed subsequent to the data normality test, this test aimed to ensure the data's homogeneity across samples, guiding the choice of statistical analysis for hypothesis testing. The procedure for testing data homogeneity using SPSS 21 mirrored that of the data normality test. Descriptive analysis generated outputs for both data normality and homogeneity. 3) Hypothesis Testing – Employed to draw conclusions from the data, this test's statistical analysis

was contingent on the outcomes of normality and homogeneity tests. Focusing on problem-solving skills and student motivation during treatment (pretest and posttest), the researcher utilized a model of project based learning and direct teaching. Hypothesis testing involved Paired Samples T-Test and Independent Samples T-Test to ascertain significant differences between the two models.

Result

The data obtained in this study is the value of students' critical thinking and creative thinking skills, with the following data description:

Student Critical Thinking Ability Data

Creative thinking skills data was obtained through written tests in the form of problem descriptions with a total of 6 items covering aspects of creative thinking skills including fluency, flexibility, originality, Elaboration, Critical Thinking, Problem-solving, Interpretation, Risk Taking, Imagination, and Self-Regulation. The results of the distribution and descriptive data of students' creative thinking skills can be seen in Table 2 and Table 3.

Table 2.
Student Creative Thinking Skills Data

No	Interval Value	Middle Value	Frequency			
			Control class	Percentage (%)	Experimental classes	Percentage (%)
1	41-48	44,5	4	7,14	0	0
2	49-56	52,5	9	16,07	0	0
3	57-64	60,5	17	30,35	6	10,72
4	65-72	68,5	20	35,72	13	23,21
5	73-80	76,5	3	5,35	20	35,72
6	81-88	84,5	1	1,79	13	23,21
7	89-96	92,5	0	0	4	7,14
			56	100	56	100

Based on Table 2, it is evident that the predominant frequency in the control group ranges from 65 to 72, with a central value of 68.5. Conversely, the prevailing frequency in the experimental group falls within the 73 to 80 range, with a median value of 84.5. This implies that the value range for the experimental class is superior to that of the control class.

Table 3.
Data on Students' Creative Thinking Skills

No	Aspects	Control class	Experimental classes
1	Fluency	67.32	80.17
2	Flexibility	64.24	81.88
3	Originality	68.38	86.50
4	Elaboration	61.54	87.63
5	Critical Thinking	64.84	78.12
6	Problem-solving	69.12	81.62
7	Interpretation	64.71	79.41
8	Risk Taking	73.14	85.01
9	Imagination	63.24	75.74
10	Self-Regulation	60.29	87.50

Table 3 shows that the average value of aspects of students' creative thinking skills in the experimental class was higher than in the control class. The highest increase in the average value of the control and experimental class is in the elaboration aspect. Achievement of the highest value of the

average control class and experiment contained in the elaboration aspect. The lowest increase in the average value of the control and experiment class is found in the aspects of Interpretation and Self-regulation. Achievement of the lowest value of the average control and experimental class is in the evaluation.

Student Learning Motivation Data

Data distribution results and descriptive data on students' motivation can be seen in Table 4.

Table 4.
Student Motivation Data

No	Interval Value	Middle Value	Frequency			
			Control class	Percentage (%)	Experimental class	Percentage (%)
1	41-48	44,5	14	25	0	0
2	49-56	52,5	16	28,57	0	0
3	57-64	60,5	7	12,5	8	14,28
4	65-72	68,5	16	28,57	12	21,43
5	73-80	76,5	0	0	14	25
6	81-88	84,5	3	5,35	18	32,14
7	89-96	92,5	0	0	4	7,14
			56	100	56	100

Table 4 illustrates that the predominant frequency in the control group is within the range of 65 to 72, with a central value of 68.5. In contrast, the prevalent frequency in the experimental group falls within grades 81 to 88, with a central value of 84.5. This indicates a higher grade level for the experimental class compared to the control class.

Table 5.
Data on Students' Creative Thinking Skills

No	Aspects	Control class	Experimental classes
1	Self-efficacy	68.82	80.01
2	Active learning strategy	62.72	82.63
3	Science learning value	61.51	81.40
4	Performance goals	61.08	89.64
5	Achievement goals	65.41	82,24
6	Learning environment stimulation	74.62	88.20

Table 5 indicates that the mean score for students' creative thinking skills in the experimental group exceeded that

Table 7.
Paired T-Test Results

		Paired Samples Test			
		Mean	Std. Deviation	T	Sig. (2-tailed)
Pair 1	Pretest control Group Posttest control Group	-5,221	1,761	-4,643	,002
Pair 2	Pretest Group Experiments PosttestExperimental Group	-5,712	1,978	-5,201	,000

From the table provided, the outcomes of the Sig. (2-tailed) for both pre-test and post-test in the control group are 0.002, while in the experimental group, the Sig. (2-tailed) for the pre-test and post-test is 0.000. These findings indicate that both the control and experimental groups exhibit a Sig. <0.05, signifying a significant impact on both

Table 8.
Independent t-test results

		Independent Samples Test			
		Mean	T	Sig.	Sig. (2-tailed)
Posttest results	Equal variances assumed	-0,700	-,288	,712	,000
	Equal variances not assumed	11,700	-,288	-5,201	,000

Based on the data presented in the table, the significance level (2-tailed) for both groups is 0.000. These findings, where both groups exhibit a value of $0.000 < 0.05$, indicate substantial differences in the impact of the control and experimental groups on creative thinking skills and learning motivation. Therefore, it can be concluded that there are statistically significant variations between the two groups in terms of their effects on creative thinking skills and learning motivation.

Discussion

This study investigates the influence of Project-based Learning (PjBL) on enhancing creative thinking skills and fostering learning motivation within the realm of physical education instruction. The findings from the analysis of the gathered data reveal a noteworthy trend. The experimental cohort, which underwent instruction using the PjBL approach, exhibited a substantial surge in creative thinking

of the control group. The most substantial improvement in average scores for both groups occurred in the evaluation aspect. The highest average score for both the control and experimental groups was observed in the evaluation aspect. Conversely, the least improvement in average scores for both groups was observed in the areas of Interpretation and Self-regulation. The lowest average scores for both the control and experimental groups were noted in the evaluation aspect.

Hypothesis Testing Results

The Shapiro-Wilk normality test results ($\text{sig}=0.434$) confirmed a normal distribution, and the Levene test ($\text{sig}=0.533$) validated homogeneous variance. The chosen data analysis method involves the application of the t-test with a 5% significance level. Two variations of the t-test, namely the paired t-test and independent sample t-test, are employed to discern mean differences between two independent sets of population or data

creative thinking skills and learning motivation. In conclusion, the statistical significance (Sig. <0.05) in both the control and experimental groups implies a noteworthy influence on creative thinking skills and learning motivation. The experimental group, with a lower Sig. value, suggests a potentially more impactful outcome.

abilities compared to the control group subjected to traditional direct teaching methodologies. Examining the distribution tables for creative thinking skills (Table 2 and Table 3) illuminates intriguing disparities. Notably, the experimental group demonstrated the highest frequency within the value range of 73 to 80, boasting a mean score of 84.5. Conversely, the control group's highest frequency fell within the 65 to 72 value range, with a mean score of 68.5. This discrepancy underscores the superior performance of the experimental group, implying a marked elevation in their creative thinking abilities facilitated by the PjBL model. Further analysis of the various facets of creative thinking skills elucidates compelling insights. The experimental cohort consistently outperformed the control group across all aspects, with the most substantial improvement observed in the elaboration aspect, albeit marginal enhancements in interpretation and self-regulation, and both groups displaying lower scores in the evaluation aspect. Turning to the assessment of learning motivation (Table 4), a similar pattern

emerges. The experimental group exhibited a predominant frequency within the value range of 81 to 88, accompanied by a mean score of 84.5, whereas the control group's highest frequency was within the 65 to 72 range, with a mean score of 68.5. This disparity suggests a heightened level of learning motivation among participants exposed to the PjBL approach. Statistical analysis, as depicted in Table 7 and Table 8, through T-test examination, underscores a significant difference (Sig. <0.05) between the two groups. Notably, the experimental group, utilizing the PjBL model, yielded more pronounced improvements in creative thinking skills and learning motivation compared to the control group. Comparatively, these findings align with similar research endeavors, indicating a consistent trend towards the efficacy of PjBL in enhancing creative thinking skills and fostering learning motivation across diverse educational contexts. However, further studies are warranted to delve deeper into the nuanced mechanisms underlying these observed effects and explore potential variations across different demographic or subject-specific parameters.

In parallel, a study by of Anazifa & Djukri (2017), and Wyness & Dalton (2018) supports these findings, indicated that project-based learning positively influences students' critical and creative thinking skills. The novelty of our data lies in its meticulous examination of various creative thinking aspects and learning motivation, shedding light on specific areas for improvement within the PjBL model. This research contributes novel insights into the domain of pedagogical methodologies, emphasizing the PjBL model's potential to reshape and elevate students' cognitive abilities and motivation in physical education contexts.

The other study from Chis et al. (2018); Zeliha (2017) also indicated that PjBL was identified as a significant factor in increasing student learning motivation. Students' participation in project-based learning was identified as an experience that spurred their interest, engagement, and enthusiasm for learning. Other research results from Safaruddin et al. (2020) show that PjBL can provide challenges and task contexts that can increase students' intrinsic motivation. These projects provide meaning and relevance for students, leading to increased motivation to learn (Almulla, 2020). Other research from Festiawan et al. (2021), and Wongdaeng & Hajihama (2018) highlights that PjBL not only increases students' learning motivation, but also helps develop lifelong learning skills. Students tend to be more motivated because they see real goals and results from their work. Research from Nilsson et al. (2018) highlights that PjBL can create learning conditions that support student learning motivation, especially through giving students responsibility for their own projects, which can increase a sense of ownership and intrinsic motivation.

The novelty value of the results of this research lies in the finding that the application of PjBL in the context of physical education learning has a significant positive impact on students' creative thinking skills and learning motivation. Several novel aspects that can be identified through this research include: 1) This research reveals that PjBL makes a

significant contribution in improving students' creative thinking skills. This includes improvements in aspects such as fluency, flexibility, originality, elaboration, and others. These findings provide an empirical basis for the effectiveness of PjBL in stimulating students' creative thinking in physical learning contexts. 2) The research results show that students who take part in learning with PjBL have a higher level of learning motivation compared to students who receive direct instruction. This shows that the project-based learning approach is able to stimulate students' interest and enthusiasm for learning, which is an important component in academic achievement and personal development. 3) Through a comparison between the experimental group (PjBL) and the control group (direct teaching), this research contributes to the understanding of the relative advantages of PjBL in achieving learning objectives. This comparison provides practical insights for the development of more effective teaching methods in the physical education context. 4) This research emphasizes the importance of including creative aspects in physical learning. These findings can be a basis for educators to improve their physical learning designs, not only focusing on physical aspects, but also exploring and developing students' creativity. Thus, the novelty value of this research lies not only in confirming the effectiveness of PjBL, but also in providing a deeper understanding of how a particular learning approach can influence creative skills and learning motivation in the context of physical education.

In conclusion, based on existing data, it can be concluded that the application of Project-Based Learning (PjBL) has a better impact on creative thinking skills and learning motivation compared to direct teaching methods. The PjBL model encourages the development of students' creative skills and learning motivation, providing a foundation for innovative learning approaches in the field of physical education. This research stands as a beacon in the realm of pedagogical methodologies, underscoring the transformative potential of the PjBL model to reshape and elevate students' cognitive abilities and motivation in the dynamic landscape of physical education.

Conclusion

Based on the findings of the study, it can be concluded that 1) The Project Based Learning (PjBL) model has a favorable impact on students' critical thinking skills in physical education, 2) The PjBL model positively influences learning motivation in physical education, and 3) The PjBL model yields a more positive outcome compared to the direct teaching model in enhancing students' creative thinking skills in the context of physical education.

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