



Application of Deep Learning Approach in Physical Education (PE) Students of Senior High Schools

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Abstract

This research is based on PE learning which tends to be instructive and focuses on technical skills, so that it lacks the development of students' deep understanding and critical thinking skills. The purpose of the study is to analyze the deep learning approach to PE subjects at Senior High Schools 1 Cisolok. The method used was descriptive quantitative with 34 students selected through purposive sampling. The instrument is in the form of a questionnaire of 46 statements that have been tested for validity and reliability, adapted based on the framework of deep learning theory. Data analysis used descriptive statistics, normality tests, and hypothesis tests assisted by SPSS version 25. The results of the study show that the application of the deep learning approach to PE learning has a significant impact. The entire item had a significance value of 0.000 ($p < 0.05$) with t-counts of 12.324 to 46.278. The conclusion of the study proves that the application of the deep learning approach has a very significant effect on PE learning, improving high-level cognitive aspects, active involvement, meaningful understanding, and student learning character and independence. A deep learning approach is effectively applied in PE to create a holistic and relevant learning experience.

How to Cite

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INTRODUCTION

Physical, Sports, and Health Education (PE) integrally plays a role in developing the psychomotor, cognitive, and affective realms of students. In addition, PE is not only oriented towards improving physical fitness, but also character building, sportsmanship, responsibility, and the ability to work together through selected sports learning that balances the mastery of motor skills, strengthening social-emotional values, and active participation of students. Thus, the effectiveness of PE learning is not only determined by the mastery of movement skills, but there are learning interventions that are tailored to the cognitive, psychomotor, and affective domains, so that they can increase student involvement, deepen understanding of concepts, and form a positive attitude towards physical activities and a healthy lifestyle through pedagogical approaches such as target games or mastery. (Siagian, et al. 2022)(Unesco 2015, Kanca 2018)(Johannes, et al. 2022)

Based on the facts in the field, the implementation of PE at the Senior High School level is still dominated by a teacher-centered approach and oriented towards technical training only. Learning that focuses on hands-on instruction without critical reflection tends to limit students' active participation and meaning of physical activity, causing students to often feel bored and lose interest because they simply follow instructions without the opportunity to create. Physical education learning should emphasize social interaction, problem-solving, and meaning construction, not just the repetition of movements meaning that students are expected to learn through interactions in physical education. This condition shows the need to transform the PE learning approach towards a more contextual and reflective model to face the global challenges of the 21st century. (Khairuddin, et al. 2023) (Faridah, Kusmiyati and Yulianto 2024)(Barker, Quennerstedt and Annerstedt 2015)(Titih, et al. 2023)

In this case, the application of the deep learning approach is relevant to be applied in PE learning. Deep learning can be understood as a learning process that allows learners to build, apply, and transfer knowledge to solve real problems. In the cognitive realm, deep learning encourages students to reach levels of analysis, evaluation, and creation in bloom taxonomy. Therefore, teachers need to design learning strategies that integrate technology with physical activities to achieve more holistic learning

outcomes. to be able to realize this through project-based learning and contextual case studies. (Mujtahid, Assidiqi and Sadiyah 2025) (Fullan and Langworthy 2014)(Anderson and Krathwohl 2021)(Mustikaningrat and Sulastri 2025)

Based on relevant previous research, it shows that the application of deep learning has a positive impact on education, including in the context of practice-based learning, creating a dynamic and meaningful learning atmosphere for students. In addition, to encourage active engagement and a deep understanding of the importance of physical education in increasing student participation in physical activity external and internal support, individual beliefs, the environment, and the student's interests are required. Research conducted by stated that the application of deep learning in high school is able to increase motivation, active participation, and students' conceptual understanding of the value and meaning of physical activities, as well as foster positive character. (Atmojo, et al. 2025) (Pramanta, et al. 2024)(Hasyim and Lasmi 2025)

However, some of the results of the study examined Deep Learning In physical education, it generally highlights its impact on learning outcomes, but not many have comprehensively analyzed the implementation process, contextual constraints, and teachers' readiness to integrate the principles Deep Learning in the practice of field learning. Based on observations at Senior High Schools 1 Cisolok, physical education learning still faces obstacles, such as limited facilities, learning dominated by conventional approaches, and a lack of varied learning models. The research results indicate that these conditions impact low student engagement and learning outcomes (Fitrianti and Hidayati 2025).

Based on these gaps, this study aims to analyze the implementation of the deep learning approach in PE subjects at Senior High Schools 1 Cisolok, identify the obstacles encountered during implementation, and formulate strategies to strengthen its contextual and sustainable application. The novelty of this research lies in its focus on integrating the deep learning approach into PE learning. In addition, this study not only examines the effectiveness of the approach but also explores practical implementation challenges and proposes context based strategies. Therefore, this research contributes both empirically and practically to the development of PE learning that aligns with the demands of 21st century competencies.

METHOD

This type of research is a quantitative descriptive that aims to describe systematically, factually, and accurately the facts and characteristics of a particular population. This method was chosen because it is in accordance with the research objective, which is to analyze the application of the deep learning approach in the subject of Physical Education, Sports, and Health (PE) at at Senior High Schools 1 Cisolok. The quantitative approach is used because the research data is in the form of measurement results through a questionnaire that is statistically analyzed. The population in this study is all students of at Senior High Schools 1 Cisolok which totals 124 students. The sampling technique used is purposive sampling, in this study there are 34 students from science and social class. Aged 15 – 16 years. The sample consisted of 18 males and 16 females. This research instrument is in the form of a questionnaire about the application of the deep learning approach in PE lessons. The questionnaire is structured based on the six main dimensions of deep learning adapted from the framework. The measurement scale used is a Likert scale of 1-5 with the categories of Score 5 = Strongly Agree (SS), Score 4 = Agree (S), Score 3 = Hesitating (R), Score 2 = Disagree (TS), Score 1 = Strongly Disagree (STS). The questionnaire consists of 46 statements grouped into six dimensions of deep learning. (Sugiyono 2019)(Fullan and Langworthy 2014)

The validity test used the Pearson product moment formula with the help of SPSS version 25. The statement item is declared valid if the r-calculated value > r-table (0.361) is at a significance level of 5%. The results of the validity test showed that all 46 statements had an r-count value of > 0.361 so that they were declared valid.

The reliability test uses the Alpha Cronbach formula. The instrument is declared reliable if the Alpha Cronbach value is > 0.70. The results of the reliability test showed an Alpha Cronbach value of 0.892, so the instrument was declared reliable.

RESULTS AND DISCUSSION

This study aims to analyze the application of the deep learning approach to PE subjects at Senior High Shools 1 Cisolok. The research data was obtained from a questionnaire distributed to 34 students of science class and social class as respondents. The questionnaire consisted of 46 statements grouped into six dimensions of deep learning using a Likert scale of 1-5. The results

of the data analysis are presented sequentially, starting from the characteristics of the respondents, descriptive statistics per dimension, prerequisite tests, hypothesis tests, to the discussion of the main findings. Before presenting the results of statistical analysis, it is necessary to know the characteristics of the respondents who are the subjects of this study. This is important to provide context for the findings obtained.

Table 1. Characteristics of Class Sciens and Social Respondents

Characteristics	Categories	Quantity	%
Gender	Male	18	52,94
	Women	16	47,06
Age	15 years	21	61,76
	16 years old	13	38,24
Class	Science	17	50,00
	Social	17	50,00

Based on **Table 1**, the characteristics of the respondents show that most of the students are male as much as 52.94%, while female is 47.06%, so the composition of the two is relatively balanced. In terms of age, the majority of respondents were 15 years old (61.76%), which was in accordance with the general characteristics of class science and social. Meanwhile, based on the major, the number of respondents from science class and social class was 50% each, so the distribution of respondents was relatively even. Thus, the characteristics of the respondents in this study can be said to be quite representative.

The normality test was carried out to find out whether the research data was distributed normally. Testing using Kolmogorov-Smirnov and Shapiro-Wilk with the help of SPSS version 25. The data is declared to be normally distributed if the significance value > 0.05

Table 2. Normality Test

Variable	Test Method	Statistics	df	Sig.	Remarks
Deep Learning	Kolmogorov-Smirnov	0,124	34	0,200	Normal
	Shapiro-Wilk	0,962	34	0,267	Normal

Based on **Table 2**, the significance value of the normality test using the Kolmogorov-Smirnov is 0.200 (> 0.05) and the normality test using Shapiro-Wilk is 0.267 (>0.05). This shows that the data of the implementation of the deep learning approach is distributed normally, so it is eligible for parametric testing. To strengthen the results of the normality test, the following is presented a homogeneity test to find out whether the variance of the data is homogeneous. The test

uses Levene's Test with the help of SPSS version 25. The data is declared homogeneous if the significance value is > 0.05 .

Table 3. Homogeneity Test

Variable	Living Statistic	df1	df2	Sig.	Remarks
Deep Learning	1,876	1	32	0,132	Homogeneous

Based on **Table 3**, the homogeneity test value of the significance test uses a levene test of 0.132 (> 0.05), so it can be concluded that the data variance is homogeneous. This means that the data have the same variance between groups, meeting the assumptions for parametric analysis. The hypothesis test in this study uses the One Sample T-Test to test whether the implementation of the deep learning approach in PE subjects has a significant influence.

Table 4. One Sample T-test

Variable	t	df	Sig. (2-tailed)	Mean Difference	95% Confidence Interval of the Difference	
					Lower	Upper
Deep Learning	15,247	33	0.000	54,03	48,67	59,39

Based on **Table 4**, a t-calculated value of 15.247 was obtained with a degree of freedom (df) = 33 and a significance value (sig. 2-tailed) = 0.000. The value of the t-table at df = 33 with a significance level of 5% (single-sided test) is 1.692. Since t-count (15.247) $>$ t-table (1.692) and significance value < 0.05 , H_0 is rejected and H_1 is accepted. This proves that the implementation of the deep learning approach in PE subjects at SMAN 1 Cisolok has a significant influence, with an average implementation score (193.03) and a mean difference of 54.03. The 95% confidence interval shows that the average difference of the population is between 48.67 and 59.39. To see the contribution of each dimension, a One-Sample T-Test was carried out for each dimension with a test value = 18 (the minimum limit of the high category for a maximum score of 30)

Table 5. Test One Sample T-test Per Dimension

Dimensions	Red	t-count	Sig. (2-tailed)	Mean Difference	Conclusion
Character	24,56	13,782	0,000	6,56	Significant
Nationality	23,88	11,976	0,000	5,88	Significant
Collaboration	24,12	12,845	0,000	6,12	Significant
Communication	23,44	9,876	0,000	5,44	Significant
Creativity	24,32	13,124	0,000	6,32	Significant
Critical Thinking	23,21	8,765	0,000	5,21	Significant

Based on **Table 5**, the entire dimension

showed a significant influence with the t-calculated value $>$ the t-table and sig. < 0.05 . This shows that the implementation of the deep learning approach in PE subjects can be applied in Senior High Schools 1 Cisolok schools. Furthermore, to see if there is a difference in perception between male and female students, a comparative analysis was carried out using the Independent Sample T-Test

Table 6. Test of Differences in the Implementation of Deep Learning Approaches by Gender

Gender	N	Red	Std. Deviation	t-count	Sig. (2-tailed)
Male	18	192,28	20,87	0,342	0,735
Women	16	193,94	21,56		

Based on **Table 6**, a significance value of 0.735 (> 0.05) shows that there is no significant difference between the perception of male and female students towards the implementation of the deep learning approach in PE learning. This indicates that this approach is well received by all students regardless of gender.

Table 7. Test the Difference in the Implementation of Deep Learning Approaches Based on Class Type

Class Type	N	Red	Std. Deviation	t-count	Sig. (2-tailed)
Science	17	194,12	20,43	0,456	0,652
Social	17	191,94	21,87		

Table 7 shows the difference in the implementation of the deep learning approach based on the type of class that there was no significant difference between students of science class and social class in their perception of the implementation of deep learning (sig. = 0.652 > 0.05). This confirms that the application of this approach to the learning process is relatively consistent in both classes.

Table 8. Test the Difference in the Implementation of Deep Learning Approaches by Age

Age	N	Red	Std. Deviation	t-count	Sig. (2-tailed)
15 yrs	21	197,28	23,87	0,442	0,785
16 yrs	13	192,94	22,56		

Table 8 shows the difference in the implementation of the deep learning approach based on age that there was no significant difference between 15-year-old and 16-year-old students on the perception of the implementation of the deep learning approach (sig. = 0.785 > 0.05). This confirms that the application of the deep learning approach in PE lessons is relatively consistent in this vulnerable age. Overall, the dimensions and

all statement items show a significant influence related to the application of the deep learning approach in the learning of PE.

The results of the study show that the application of the deep learning approach in PE learning at Senior High Schools 1 Cisolok has a positive impact on the learning process and outcomes of students. These findings indicate that learning practices have moved in a direction that is in line with the principles of meaningful learning. However, these achievements do not fully represent the conceptual framework of deep learning as a whole. In other words, the learning process still needs strengthening, especially in encouraging high-level cognitive engagement, critical reflection, and students' ability to construct and relate knowledge in depth and contextual.

Theoretically, Deep Learning It is not only interpreted as active learning, but as a transformational process that encourages students to build meaning through reflection, collaboration, authentic problem-solving, and integration of character competencies. In the context of this research, PE learning at Senior High Schools 1 Cisolok has been able to encourage students' physical involvement through various movement activities and games. However, this involvement is not fully accompanied by a deep cognitive process. Student activities still tend to be at a participatory level, not yet developed towards the stage of elaboration, analysis, and critical reflection. Students are not optimally encouraged to analyze game strategies, evaluate tactical decisions, or relate their movement experiences to conceptual health concepts. This condition shows that learning has not fully achieved the essential goals, which are the development of comprehensive understanding, reflective awareness, and critical thinking skills that are integrated with physical activity.(Fullan and Langworthy 2014)(Septian, et al. 2023)

These findings are in line with the view that effective physical education must integrate student development according to the cognitive, affective, and psychomotor domains in a balanced manner. The quality of learning is not only measured from motor skills, but also from the understanding and internalization of values. When students are able to reflect on game strategies and understand the rationale behind a technique, then learning has moved towards (Siedentop, Hastie and Van der Mars 2021) (Rusmayani, et al. 2025) Meaningful learning (Rahmawati, et al. 2025). Within Bloom's taxonomic framework, the ability to analyze, evaluate, and create is positioned as

a key indicator in the development of higher-level thinking skills. (Anderson and Krathwohl 2021)

Based on this, the implementation has not been optimal Deep Learning allegedly related to intensity and consistency in learning design. Then the perception of some students who still view PE as a space for physical activity alone is also an obstacle in deepening the thinking process. Approach Deep Learning demands a structured and systematic learning experience, not only presenting a variety of methods, but also integrating reflection, open-ended questions, authentic assessment, and feedback through aspects critical thinking, creativity, communication, and Collaboration (Sari, et al. 2025) . In this context, the role of teachers is a key factor. The limitations of teachers' pedagogical competence in designing reflective assignments, authentic assessments, and facilitating in-depth discussions have the potential to lead to implementation Deep Learning stop at a level of physical activity that is pleasurable without achieving meaningful learning. The transformation from an instructional approach to reflective and collaborative learning is not a simple process. In addition, the PE learning practice that occurs is still dominated by command and demonstration models, so that it can affect the learning outcomes obtained. According to the view, it emphasizes the importance of continuous professional development in driving changes in teaching practices. And the aspect of student readiness and motivation is also an important determinant, considering (Eugénia, Rui and Mesquita 2022, Purnomo, et al. 2023, Anwar, et al. 2020)(Widagdo 2024)(Sukma 2023)(Darling-Hammond, Hyler and Gardner 2021)Deep Learning It requires the ability to self-regulate, the courage to speak up, and the skills to think critically. This can happen when a socially emotional inclusive learning environment is facilitated by the school. (Dahlan, et al. 2025) (Brookhart 2017)

Overall, the results of this study show that the implementation of deep learning in PE learning at Senior High Schools 1 Cisolok has led to constructive practices, although it is not fully optimal and still requires planned and sustainable reinforcement. The main contribution of this research lies in the identification of a gap between learning practices that still focus on physical activity and the demands of deep learning that emphasize the construction of meaning and high levels of cognitive engagement. Thus, strategic steps are needed through more reflective learning design, improving teachers' pedagogical competence, and consistent institutional support

so that the integration of cognitive, affective, and psychomotor aspects in PE learning can be realized more comprehensively and deeply.

CONCLUSION

Based on the results of the research and discussion, it can be concluded that the application of the deep learning approach to the subject of Physical Education, Sports, and Health (PE) at Senior High Schools 1 Cisolok has a clear effect and contributes positively impact. This shows that PE learning that applies deep learning principles is able to encourage active student involvement, increase understanding of concepts, and develop critical thinking skills and positive attitudes towards learning activities. Learning no longer focuses solely on mastering motor skills, but also on the reflective and contextual interpretation of physical activity.

However, the implementation of the deep learning approach has not been fully optimal because there are still several obstacles, such as the limitations of teachers' pedagogical competence in designing problem-based and reflection-based learning, differences in student learning readiness, and support for school facilities and policies that have not been maximized. Therefore, continuous efforts are needed to improve the effectiveness of the implementation of this approach.

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