

Locus of Control (LoC): Improving Student Physical Education Learning Outcomes

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Abstract

Many things influence Learning outcomes, including the Locus of Control (LoC). LoC is a term in psychology that shows a person's beliefs about what causes good or bad things in their life, both in general matters and in specific matters such as health or academics. The research aims to analyze the effect of LoC on improving physical education learning outcomes. The research design is a quasi-experiment with a time-series design. The researchers selected elementary school students in Sumedang Regency as the population and used purposive sampling. Apart from that, the instruments used to measure LoC learning outcomes are multiple-choice and questionnaire-based. The research results showed that the students' internal LoC was 70.7% and the external LoC was 59.7%. The significance value in the multiple regression test for Internal and External LoC is <0.05 for each. Then, we obtained a P-value of $0.000 < 0.05$ when testing the hypothesis using one-way ANOVA. Meanwhile, the R-squared value was 0.718. This value indicates that the internal and external LoC variables account for 71.8% of the increase in physical education learning outcomes among elementary school students. Meanwhile, other variables outside this regression equation, or variables that were not examined in this study, influence the remaining $100\% - 71.9\% = 28.9\%$. This research concludes that there is a significant simultaneous influence of internal and external LoC on improving physical education learning outcomes for elementary school students in Sumedang Regency.

Keywords: Elementary School, Learning Outcomes, Locus of Control, Physical Education.

Introduction

Learning is a process. To help regular students learn effectively. The extent to which students achieve higher learning outcomes, which are a sign of the success of the learning process, is determined by their learning outcomes. Learning outcomes are conclusions students draw after integrating their knowledge and abilities during the learning process (1). Researchers typically present these conclusions quantitatively or numerically.

Furthermore, experts define learning outcomes as the product of interactions between learning and teaching actions, where students achieve behavioral changes through learning activities (2). However, learning outcomes can also be determined by how a student's character evolves through the acquisition of knowledge via specific learning mechanisms or sequences (3). Numerous

elements influence student learning outcomes, including Locus of Control (LoC), which shapes their development (4). A person's perception regarding the underlying causes of events in their life is known as the Locus of Control.

According to the social learning approach, Julian Rotter, a U.S. psychologist, is credited with developing the idea of LoC. LoC is a psychological concept within social learning theory that reflects shared desires regarding variables that influence success, rewards, and punishments in human life (5, 6). The concept of LoC refers to a student's perception of an event, regardless of whether he believes he influences it. Based on one statement, the personality trait known as LoC refers to an individual's or student's belief in their abilities and whether it gives them power over their future (7). Meanwhile, there are two types of LoC: internal

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and external. Students who identify as Internal LoC have a strong sense of control over their life experiences. They have unique traits such as high drive, initiative, optimism, and enterprise, and they understand that success brings significant rewards (8). However, research findings show that God Almighty also determines students with external LoC (9, 10). In addition, based on the context previously explained, this research focuses on how LoC influences the learning abilities of elementary school students in Sumedang Regency. This LoC is essential for students, especially in teaching and learning activities, because it reflects their perception of the extent to which the relationship between their efforts and the results they achieve—in this case, personal behavior—is influenced by external factors or beyond their control.

Additionally, some people believe that hard work and talent are the main factors in achieving success. In contrast, others believe that forces such as chance, fate, and destiny can positively influence a person's path to success. Meanwhile, scholars often encounter a public saying: "an intelligent person is lower than someone who has good luck or someone stupid/lucky." Based on his observations, many elementary school students in Sumedang Regency have learning outcomes below standard. The fact that many students continue to receive relatively low midterm grades indicates low learning outcomes. Therefore, LoC will likely affect children's learning outcomes if their elementary school learning outcomes do not meet the Minimum Completion Criteria—research (11). This factor supports the impact of LoC on student learning achievement. Several factors, including Locus of Control (LoC), influence improvements in learning outcomes (12, 13). For this reason, researchers wanted to verify this claim. This research will examine how LoC influences cognitive learning success at levels C1–C4 in the Physical Education field of study for elementary school students in Sumedang Regency.

Methodology

Design and Research Procedure

This research aims to look for the influence of LoC on improving learning outcomes in terms of knowledge (cognitive level 1 or C1), look for the influence of LoC on improving learning outcomes in terms of understanding (cognitive level 2 or C2)

for the influence of LoC on improving learning outcomes in terms of application or application (cognitive level 3 or C3), and look for the influence of LoC on improving learning outcomes in terms of analysis (cognitive level 4 or C4). Therefore, the suitable research method is a quantitative, quasi-experimental design. A quasi-experiment is research in which the researchers cannot control all relevant variables (14). Therefore, this research shows the cause-and-effect relationship between the independent and dependent variables. In addition, this research uses a time-series design.

The author selected a quasi-experimental time-series design because it allows for the validation of the impact of Locus of Control (LoC) on learning outcomes across three key dimensions. First, repeated measurements establish a stable baseline, ensuring that the observed changes reflect the impact of LoC rather than random fluctuations. Secondly, this approach emphasizes developmental trends, suggesting that pupils with an internal locus of control exhibit more consistent patterns of advancement. Ultimately, regular monitoring substantiates the causal association, affirming LoC as a crucial predictor. Thus, this design offers substantial empirical evidence about the influence of psychological dispositions on enduring learning achievement in physical education.

Participants and Research Site

The study population consisted of elementary school students in Sumedang Regency (approximate GPS coordinates: 6°51'03.2"S 107°55'02.6"E). The researchers selected the students because they met the sampling criteria. The sampling technique used was purposive sampling. Purposive sampling is a method in which researchers select samples based on the cognitive level of the participants. The researchers chose this method because purposive sampling allows them to obtain the most representative information. Therefore, the sample in this study was 31 people. The study population consisted of elementary school students in Sumedang Regency. The researchers selected this population because it met the established sampling criteria. The sampling technique employed was purposive sampling. Purposive sampling is a method in which the researcher selects a sample based on specific attributes—in this case, participants' cognitive levels. The researcher chose this method because

purposive sampling enables them to obtain the most relevant information to meet the research objectives. Consequently, the sample for this study comprised 31 individuals. In applying the purposive sampling technique, the researchers selected these 31 students based on how closely their characteristics aligned with the research's specific goals. The primary criteria were the students' cognitive maturity and communication skills, which were considered crucial to ensuring the data obtained were of high depth and accuracy. By focusing on students within a specific age range or grade level in Sumedang Regency, the researcher was able to mitigate potential biases arising from stark differences in mental development, thereby rendering the data collection process more effective and measurable. The selection of Sumedang Regency as the research site provides a specific sociocultural context in which the educational environment reflects the characteristics of a transitional zone between suburban and rural areas. Although the sample size is relatively small for broad generalization, it allowed the researcher to conduct more intensive, personalized observations. This condition ensures that the resulting data provide a robust representation of the phenomenon under study—nuances that might not be captured with a larger sample size using a more superficial approach.

Procedure

After collecting data from the available instruments, the researchers assess, compile, and check the data. The instrument test of physical education learning outcomes assigns a score of 1 to the correct answer and 0 to the incorrect answer. In addition, the level of assessment and agreement

is determined using a Likert scale on the questionnaire instrument to assess the internal and external locus of control. The researchers performed additional statistical analysis, separated the levels into two categories—positive statements for internal locus of control and negative statements for external LoC—and used this assessment to convert qualitative answers into quantitative data. Five represent strongly agree (SA), four agree (A), three neutral (N), and two disagree (DA). Some strongly disagree. Namely, a score of 1 and the corresponding level of agreement stated in the internal LoC statement: strongly disagree (SDA).

Additionally, individuals who provide statements for the external LoC receive points, unlike the internal LoC questionnaire, where neutrals receive three points. Thus, the level of agreement and the type of statement in the questionnaire affect the score of each instrument differently. Similar to ratios or intervals, Likert scale scores are ordinal. The researchers must then check the instrument's validity and reliability. If the measuring instrument is inaccurate, it will give the same results. The researchers gave the instruments used in this research to the supervisor for verification. Trustworthy tools can provide a solid foundation for reliable and precise data collection for measurement or analysis. This section includes validity tests of the instrument, and the researchers evaluate and validate them using related data in SPSS software. Ensuring a research tool has high validity requires this critical step. Based on the instrument's validity assessment using SPSS version 21, Table 1 below shows that the ten statements are considered valid based on the sig. (2-Tailed) < 0.05, which indicates that the questionnaire is suitable for data collection.

Table 1: Validity Test of the External Locus of Control Instrument

Pearson Correlation	Sig. (2-Tailed)	Information
0.544	0.002	V & K
0.699	0.000	V & K
0.692	0.000	V & K
0.682	0.000	V & K
0.591	0.000	V & K
0.620	0.000	V & K
0.769	0.000	V & K
0.726	0.000	V & K
0.792	0.000	V & K
0.808	0.000	V & K
0.765	0.000	V & K
0.550	0.001	V & K
0.763	0.000	V & K

After the researchers conducted a validity test using SPSS version 21 to assess the extent to which the external LoC instrument is truly valid, Table 1 shows that 13 statements were classified as valid based on the sig value. (2-Tailed) <0.05), so the questionnaire is suitable for collecting data.

After conducting a validity test in SPSS version 21, the output in Table 2 indicates that the 10 questions are valid based on the p-value. (2-Tailed) <0.05, so the questionnaire is suitable for collecting data.

Table 2: Validity Test of Learning Outcome Instruments

Pearson Correlation	Sig. (2-Tailed)	Information
0.844	0.000	V & K
0.367	0.000	V & K
0.803	0.000	V & K
0.459	0.000	V & K
0.673	0.000	V & K
0.880	0.000	V & K
0.831	0.000	V & K
0.467	0.000	V & K
0.467	0.000	V & K
0.836	0.000	V & K

Table 3: Reliability Test of Locus of Control Instruments and Learning Outcomes

Instruments	Cronbach's Alpha	Information
Learning Outcomes	0.873	Reliable
Internal locus of control	0.876	Reliable
External locus of control	0.908	Very Reliable

This section in Table 3 includes reliability testing of instruments that have undergone relevant reliability testing, namely, using the SPSS program. This step is important to ensure high consistency across the internal and external LoC instruments used for the research's learning outcomes. Research reliability test analysis shows that the Cronbach's Alpha values for the learning outcome variable are 0.873, the internal LoC variable is 0.876, and the external LoC variable is 0.908. By applying Guilford's criteria to the analysis findings, we can conclude that, although the external locus of the control variable is also very reliable, the learning outcome variable and the internal locus of the control variable have very high reliability.

The results of the validity and reliability tests demonstrate that this instrument produces stable, consistent data across the parameters measured (14). The instrument was tested for reliability using SPSS version 21. This condition is because its application assesses the instrument's suitability for use and can provide certainty about the degree of consistency and reliability of the measuring instrument.

Research Instrument

The researchers employed two types of instruments in this research: test and non-test instruments. The researchers used a multiple-choice test instrument to measure students' learning outcomes in physical education. These questions play a crucial role in assessing

competencies, ranging from basic skills to more complex levels, including knowledge, comprehension, and the application of concepts (15).

For the non-test instrument, the researchers used a Likert-scale questionnaire to measure students' Locus of Control (LoC), specifically the Locus of Control Scale (16). This scale offers several benefits, including applicability to both qualitative and quantitative research and the ability to assess students' attitudes, opinions, and impressions regarding ongoing events. The researchers determine the internal and external LoCs using positive and negative statements, then evaluate them using a Likert scale. On this scale, students complete the questionnaire by indicating their level of agreement with various statements.

Furthermore, the researchers conducted a documentary study to review and analyze relevant literature and provide additional references for this study. This approach facilitates the determination of a student's Locus of Control when responding to specific issues. Multiple-choice tests are cognitively accurate for measuring knowledge at foundational to complex levels in physical education, particularly when the questions are applied or situational rather than merely memorization-based. In the context of this study, multiple-choice questions are appropriate for measuring conceptual understanding, while the

Likert questionnaire complements this from a psychological perspective (Locus of Control).

Data Collection and Analysis

The statistical analysis steps in this study began with descriptive analysis to map students' perceptions and to examine the distribution of data across internal and external Locus of Control (LoC) variables. Furthermore, the researchers calculated the achievement percentage by comparing students' total scores with the ideal score to determine the extent of their mastery of each variable. Thereafter, the researchers used the Kolmogorov-Smirnov test to assess normality and ensure that the regression residuals were normally distributed, a prerequisite for linear regression testing. Then, the researchers used a multiple regression test to assess the strength and significance of the influence of internal and external LoC on students' physical education learning outcomes. To explore further, a one-way

ANOVA was used to test for significant differences in learning outcomes across LoC scores. Finally, the researchers calculated the coefficient of determination (R-squared) to assess the extent to which the overall LoC variable contributed to variation in learning outcomes, with higher R-squared values indicating greater explained variation and suggesting that both internal and external LoC variables can explain learning outcomes. At the same time, other factors outside this research model influence the remaining amount.

Results

Data Descriptions

The first step after the test and questionnaire results are obtained is to generate descriptive statistics by calculating the test's mean and standard deviation. The following is a presentation of the data in question:

Table 4: Descriptive Analysis Results Using Mean and Std Deviation of Internal LoC

Indicator	Mean	Standard Deviation
P1	3.032	1.119
P10	3.541	1.034
P5	3.674	0.932
P7	3.437	0.851
P8	3.781	0.702
P4	3.844	0.812
P2	3.643	0.923
P3	3.867	0.766
P9	3.348	0.751
P6	3.756	0.922

The researchers identified the most and least indicators of internal LoC based on the descriptive analysis in Table 4 above, which uses the mean and standard deviation to describe the distribution of students' control attitudes. The statement that the efforts have resulted in achievement and ranking is the most prominent indicator, while the researcher's confidence in taking the exam is the

least known. After distributing the questionnaire to the students, the researchers can use a descriptive test to confirm that they obtained the total score for the internal LoC variable from the completed questionnaire. The score is 1,096, and the total ideal score is 1,550. So, the internal LoC for students is $1,096:1,550 = 0.707 = 70.7\%$.

Table 5: State of Students' Internal LoC

Respondent Code	Value	Respondent Code	Value	Ideal Score	
R-1	31	R-12	34	1.550	
R-2	32	R-13	35		
R-3	22	R-14	37		
R-4	30	R-15	41		
R-5	34	R-16	42		
R-6	41	R-17	40		
R-7	40	R-18	43		
R-8	32	R-19	38		
R-9	38	R-20	17		
R-10	39	R-21	40		
R-11	33	R-22	35		
R-31	34	R-23	37		
		R-24	41		
		R-25	35		
		R-26	28		
		R-27	35		
		R-28	35		
		R-29	40		
		R-30	37		
Total= 1.096					

Based on the descriptive analysis of the mean and standard deviation in Table 5, the researchers identify the distribution of students' perceptions of control in their lives and the most and least dominant indicators in the external LoC. The most dominant indicator is the statement that students would not say, "I like studying because it is our fate or talent," and the least dominant indicator is "I feel like I cannot get a good score on the test."

Meanwhile, the external locus of control can be determined using the descriptive test in Table 6. Table 7 shows the total score for the external LoC variable of 1.244. The ideal total score is 2.015. Therefore, the external LoC for these students is $1.204 : 2.015 = 0.597 = 59.7\%$. The internal LoC score for these students is 70.7%, and the external LoC score is 59.7%.

Table 6: Descriptive Analysis Results Using Mean and Std Deviation LoC

Indicator	Mean	Standard Deviation
P4	0.8019	3.2581
P7	0.7822	3.0323
P13	0.7822	2.9677
P6	0.7796	3.1935
P11	0.7510	3.1290
P10	0.7184	3.0000
P8	0.6595	3.1290
P12	0.6188	3.0645
P2	0.6086	3.1290
P5	0.5948	3.0323
P9	0.5643	3.0645
P1	0.5301	2.9032
P3	0.4913	3.1290

Table 7: State of Students' External LoC

Respondent Code	Value	Respondent Code	Value	Ideal Score	
R-1	43	R-12	40	2.015	
R-2	35	R-13	43		
R-3	41	R-14	38		
R-4	34	R-15	37		
R-5	37	R-16	42		
R-6	42	R-17	40		
R-7	39	R-18	34		
R-8	36	R-19	32		
R-9	39	R-20	44		
R-10	33	R-21	39		
R-11	39	R-22	42		
R-31	40	R-23	43		
		R-24	30		
		R-25	32		
		R-26	43		
		R-27	41		
		R-28	41		
		R-29	45		
		R-30	40		
Total= 1.204					

Physical Education Learning Outcomes

To measure student learning outcomes, the instrument used consists of objective multiple-choice questions. The multiple-choice test is used to assess more complex learning abilities and covers aspects C1-C4. This test consists of several answer options related to the main issues

presented. After distributing the questionnaire to students, Table 8 shows that the total score for the physical education learning outcome variable is 200, and the ideal total score is 310, so the physical education learning outcome for students is $200:310 = 0.645 = 64.5\%$. Therefore, the student's learning outcome score is 64.5%.

Table 8: Students' Physical Education Learning Outcomes

Respondent Code	Value	Respondent Code	Value	Ideal Score
R-1	6	R-16	5	310
R-2	5	R-17	6	
R-3	4	R-18	5	
R-4	6	R-19	5	
R-5	7	R-20	4	
R-6	6	R-21	9	
R-7	8	R-22	8	
R-8	8	R-23	7	
R-9	6	R-24	5	
R-10	5	R-25	6	
R-11	7	R-26	7	

R-12	7	R-27	6
R-13	8	R-28	6
R-14	6	R-29	8
R-15	7	R-30	8
		R-31	9
Total= 200			

Table 9: Residual Normality Test

Model	Asymp. Sig (2-tailed)	N
Residual Normality	0.223	31

Residual Normality Test

In this research, residual normality is important to ensure the validity of regression analysis results. The following table displays the test results in question. From Table 9, the researchers observed that the sig (2-tailed) value is 0.223, which is > 0.05, showing that the residuals are normally distributed.

Multiple Regression Test

Multiple regression testing, an analysis technique that is very helpful for testing, measuring, and understanding relationships among variables, is

the next test stage (internal and external LoC factors and increasing physical education learning outcomes). The two independent variables in this study justify the use of this test. The main objective of this test is to determine whether the internal and external LoC variables have a significant influence on improving physical education learning outcomes. Based on Table 10, the significance values for Internal and External LoC are both <0.05. Both internal and external LoC influence the learning outcomes of physical education.

Table 10: Multiple Regression Test

Model	Unstandardized Coefficients		Standardized Coefficients Beta	t	Sig.
	B	Std. Error			
(constant)	1736.203	4216.301		1.622	.000
Internal LoC	0.218	0.460	.532	2.401	.009
External LoC	0.257	0.082	.288	2.569	.002

Dependent Variable: Physical Education learning outcomes

Hypothesis Testing

The following testing step is an analysis test using one-way ANOVA. Table 11 below presents the intended data:

Table 11: Results of Hypothesis Testing Using One-Way ANOVA Analysis

Source	Type III Sum of Squares	df	Mean	Source	Sig.
Corrected Model	326.217 ^a	5	79.3309	13.178	0.000
Intercept	41129.121	8	256181.201	54891.200	0.004
LoC (score)	28.045	12	2.471	.761	0.000
Error	211.326	6	4.118		
Total	201287.154	31			
Corrected Total	263.150	11			

R Squared = 0.718 (Adjusted R Squared = .579)

The average pre-test and post-test LoC data in Table 11 above show that the P-value is 0.000 < 0.05. This result indicates rejection of H0, suggesting a difference between the pre-test and post-test scores. The researchers found that LoC significantly predicts elementary school children's learning outcomes in physical education. Meanwhile, the R-square value was 0.718. So, this value indicates that the internal and external LoC variables account for 71.8% of the increase in

physical education learning outcomes for elementary school students. Meanwhile, other variables outside this regression equation, or variables not studied, account for the remaining 28.1% [100% - 71.9%]. To facilitate visual illustration of the results of this study, the researcher tried to create a schematic diagram to summarize the main findings of this study as shown in Figure 1.

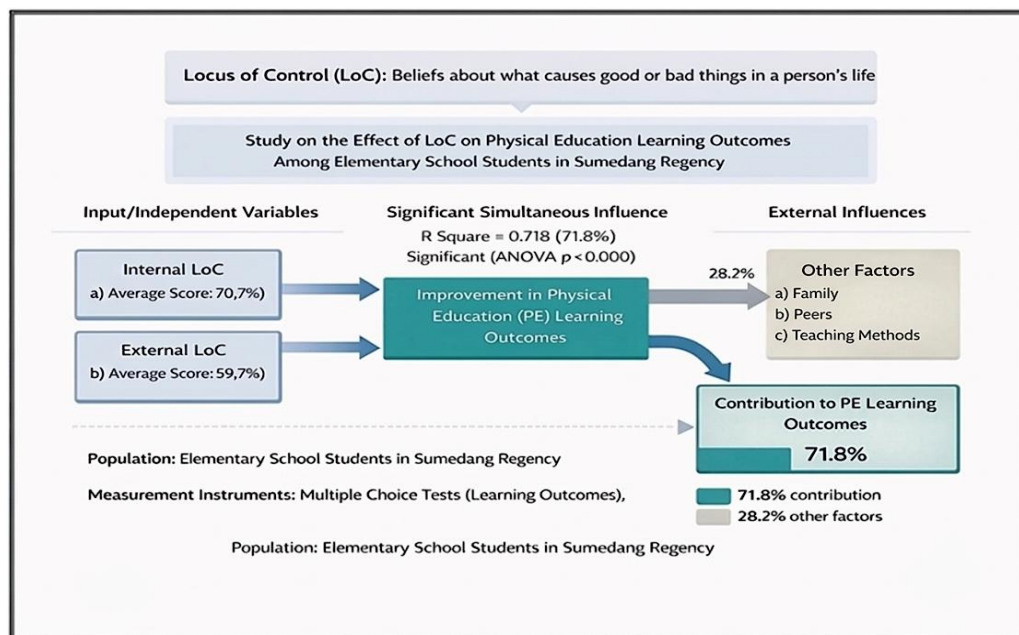


Figure 1: Schematic Diagram of Locus of Control and PE Outcome Study

Discussion

Elementary school students in Sumedang Regency have a high level of learning engagement, do not do homework at school, and do not cheat on tests; this is an indication of internal LoC findings (17, 18). For class discussion, this scenario explains why students are trying to learn at home. This example shows how students with a solid internal LoC can manage their daily tasks. Students may divide the amount of time they spend studying and playing. Students with a strong internal locus of control will be able to regulate themselves (19, 20). Positive student character is another factor that significantly influences internal LoC and student learning outcomes. In completing teacher assignments and homework, students who are confident in their talents tend to be responsible, independent, and expansive. Students will be encouraged to work on assignments independently and to clarify unclear parts with questions. Students with internal LoC will demonstrate autonomous, accountable, and developed traits when completing tasks assigned by teachers who support this (21, 22). If students cannot complete the assignment, they will feel they have failed, and they will ask the teacher what they do not understand. Internal LoC has a positive and significant effect on student learning outcomes. Self-confidence: Students have a responsible, independent, and expansive attitude in completing school assignments, which is the root of the

problem (23, 24). This condition is very natural if the results of internal LoC research have a significant, positive effect on physical education learning outcomes, given students' high motivation to learn (25–27).

This relationship is systematically supported by current views in sport psychology, which suggest that learning outcomes are not simply the accumulation of physical training but rather the product of cognitive regulation. The integration of internal and external control creates what is known as motivational harmony (28). For elementary school-aged children, perceptions of positive external control—such as feeling supported by their teachers—are crucial bridges to strengthening their internal control in mastering complex sports techniques (29, 30).

Students who have an external locus of control will have implications for their current and future character. Students with external LoC tend to be quiet when studying, lethargic when completing homework and assignments, and reluctant to ask questions when they do not understand something. For positive learning outcomes, these students rely more on luck. Students with an external locus of control often attribute their experiences to coincidence, circumstances, and fate, supporting these events (31). As a result of this situation, students feel that getting good grades depends on opportunity and closeness to the teacher, which makes them more likely to give up. Students with an external locus of control

believe that their success in school is due to chance (32, 33). This condition is because students are more dependent on fate and need more will and ambition to learn. Luck and interpersonal relationships can also contribute to high-quality work; research on external locus of control has a positive impact on work outcomes (34). One external locus-of-control factor, namely social closeness, has a significant effect on learning outcomes (35). However, there is a significant influence of internal and external LoC, acting simultaneously, on improving physical education learning outcomes.

The concurrent influence of these research findings indicates that optimal learning outcomes in physical education do not result from a student's mental isolation, but rather from the alignment of personal intent and the acceptance of external guidance (36, 37). Internal Locus of Control (LoC) functions as the 'motor' that drives physical effort, while external LoC serves as the 'navigation' that ensures this effort aligns with curricular objectives (38). This synergy ultimately generates a significant surge in learning outcomes, as students do not merely engage in movement; they are consciously aware of why they move and how their environment can facilitate their improvement.

Conclusion

This study concludes that there is a significant simultaneous influence of internal and external LoCs on improving physical education learning outcomes in elementary school students in Sumedang Regency. This condition is because LoC influences how students view and respond to learning situations. Students with an internal LoC tend to feel that their efforts and abilities determine their success or failure. This mindset encourages them to be more active, motivated, and responsible in the learning process, including in physical education subjects. Meanwhile, students with external LoC who believe that factors such as fate, luck, or other people (e.g., teachers or friends) influence outcomes may show lower motivation. However, in specific contexts, external LoC can also have a positive influence, particularly when students rely on strong external support (e.g., teacher encouragement or a supportive learning environment). Thus, both internal and external LoC contribute to learning outcomes by influencing learning behavior, motivation levels,

and student involvement in physical education activities.

Recommendations

More research is needed to determine how to create learning interventions that specifically improve students' internal Locus of Control (LoC) in the context of physical education. Longitudinal studies can also look at how LoC affects student learning and active behavior in PE classrooms over time. Furthermore, research can be enhanced by looking at other aspects, such as gender, social context, or the way a teacher teaches, as moderating variables. We can also use qualitative research to better understand how students establish their LoC, enabling us to create more tailored and effective ways for them to learn.

Limitations

Researchers should consider several limitations of this study. First, the method used was solely quantitative, so it was not possible to study students' subjective experiences regarding the development of "Locus of Control" in sports learning. Second, the study sample was limited to representative schools in Sumedang Regency. Therefore, researchers cannot generalize the results to a broader population. Third, the researchers did not fully control external factors, such as the teacher's teaching style, sports facilities, and family environment, which can influence student learning outcomes. Researchers expect these limitations to contribute to future research.

Abbreviations

None.

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Author Contributions

All authors contributed equally. Tatang Muhtar: conceptualization, data collection, Anggi Setia Lengkana: conceptualization, materials, data collection, Tedi Supriyadi: data analysis, interpretation, Mamatqulov Ravshanjon Solijonovich: conceptualization, supervision, resources, manuscript review, Nosirova Dilnoza Sobirovna: conceptualization, supervision, Zaenal

Arifin: supervisión, resources, manuscript review, manuscript writing.

Conflict of Interest

The authors declare no conflict of interest related to this study or its publication.

Data Availability

All relevant data supporting the findings of this study are summarized and presented within the results tables of this manuscript. To ensure the confidentiality and anonymity of the participants, particularly as they are minors (elementary school students), the full raw dataset is not shared externally.

Declaration of generative AI and AI assisted technologies in the writing process

The researchers utilized generative AI tools to enhance the language and grammatical structure of this manuscript. The authors performed comprehensive manual checks of all references against original publications. All intellectual content, including analysis and conclusions, was generated solely by the authors. Each section has been reviewed and approved by all authors, who maintain full accountability for the accuracy and integrity of the work.

Ethics Approval

This study did not require ethics committee approval but followed standard ethical research procedures.

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