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The Relationship Between Principal Leadership, Physical Education Teacher Readiness, and Learning Infrastructure Towards the Implementation of the Independent Curriculum

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ABSTRACT: This study aims to analyze the relationship between (1) principal leadership and the implementation of the Independent Curriculum, (2) Physical Education teacher readiness and the implementation of the Independent Curriculum, (3) learning infrastructure and the implementation of the Independent Curriculum, and (4) the combined effect of these three variables on the successful implementation of the curriculum. This quantitative correlational study involved a total population of 43 Physical Education teachers from public senior high schools across Central Lampung Regency. Data were collected using a structured Likert-scale questionnaire and analyzed through multiple regression techniques, including ANOVA testing. The findings revealed significant positive relationships across all independent variables. Principal leadership demonstrated a strong correlation with curriculum implementation ($r = 0.972$) with an effective contribution of 56.14%. Physical Education teacher readiness also showed a high correlation ($r = 0.956$), contributing 35.33%, while learning infrastructure had a moderate but significant correlation ($r = 0.667$), contributing 5.33%. When analyzed collectively, these three variables accounted for 96.80% of the total variance in the successful implementation of the Independent Curriculum ($F = 422.766$, $p < 0.05$), indicating their critical and synergistic role in supporting educational transformation in the context of Indonesian high school education.

KEYWORDS: principal leadership, teacher readiness, learning infrastructure, curriculum implementation, Physical Education, Merdeka Curriculum

INTRODUCTION

In response to the challenges of 21st-century education and the need to produce globally competent, critically thinking, and value-based learners (Ngwacho, 2024; Njonge, 2022), the Indonesian government launched the Independent Curriculum (Kurikulum Merdeka) (Hakim & Nabila, 2022; Fauzan et al. 2023). This policy shift requires schools to adapt structurally and functionally, with particular emphasis on leadership, teacher competence, and infrastructure. Physical Education, as a crucial part of the national education system, plays an important role in nurturing students' physical, social, emotional, and cognitive development (Huang, 2024; Sharma, 2024). However, implementation in Central Lampung remains inconsistent, with indications of weak instructional supervision, low teacher readiness, and inadequate physical infrastructure. This study investigates the extent to which principal leadership, Physical Education teacher readiness, and learning facilities correlate with the successful implementation of the Independent Curriculum.

The Independent Curriculum was introduced to address educational inequities caused by centralized and rigid learning systems that did not adequately accommodate student diversity or school-level autonomy. This curriculum emphasizes flexibility, learner-centered instruction, differentiated learning, and project-based tasks that are tailored to individual potential and community relevance (Chhatria et al. 2024). It promotes a decentralized approach to teaching and learning, giving teachers and schools the autonomy to design contextualized content while focusing on developing student competencies aligned with the Pancasila Student Profile. However, such transformative aspirations require strong internal leadership, adequately prepared educators, and a supportive environment to realize their goals.

Principal leadership plays a strategic role in ensuring the success of curriculum reforms. A principal is expected not only to manage administrative functions but also to act as an instructional leader who can motivate teachers, align school goals with policy directives, and manage resources effectively. Leadership in this context entails vision-building, team collaboration, and professional development facilitation. Studies (e.g., Agustin et al., 2023; Hidayat et al., 2023) have shown that effective leadership

can significantly impact how teachers respond to new curriculum demands. However, evidence related to how principal leadership affects the implementation of the Independent Curriculum in the context of Physical Education is still scarce, particularly in rural and semi-urban schools.

Teacher readiness is another fundamental component of successful curriculum implementation. In the context of Physical Education, teacher readiness includes both technical and pedagogical competence, the ability to integrate health and wellness into instruction, and adaptability to evolving educational standards. Teachers are expected to design meaningful physical activities that also address character building, teamwork, and critical thinking. Unfortunately, challenges such as insufficient professional development, increased workloads, and limited access to digital tools contribute to the lack of readiness among many Physical Education teachers in Indonesia. These conditions hinder their ability to deliver instruction in line with the goals of the Independent Curriculum.

The third pillar that supports curriculum implementation is infrastructure. Quality learning environments are vital for fostering active engagement and achieving intended learning outcomes—especially in Physical Education, where access to open spaces, sports equipment, and teaching aids is essential. Yet, disparities in infrastructure between schools—especially between urban and rural areas—continue to undermine efforts to ensure equity and excellence. In many cases, teachers in Central Lampung report inadequate facilities, ranging from the absence of basic equipment to a lack of safe and functional spaces for physical activity. Such deficiencies can compromise the delivery of curriculum content and limit student participation in physical education programs.

This study is motivated by the urgency to provide empirical evidence on school-level factors that influence curriculum reform, particularly within Physical Education. By analyzing the relationship between principal leadership, Physical Education teacher readiness, and infrastructure with the implementation of the Independent Curriculum, this research aims to reveal systemic challenges and potential entry points for intervention. The findings are expected to guide educational policymakers, school leaders, and curriculum developers in enhancing implementation strategies, reducing contextual disparities, and ensuring that every student benefits from a comprehensive and empowering learning experience under the Independent Curriculum framework.

METHOD

This study employed a quantitative descriptive correlational design to examine the relationship between principal leadership, Physical Education teacher readiness, and learning infrastructure with the implementation of the Independent Curriculum in public senior high schools. The choice of this method was based on its appropriateness for measuring the strength and direction of relationships among variables without manipulating any condition, thus allowing for generalizable insights within the natural school environment.

The population in this study consisted of all Physical Education teachers working at public senior high schools across Central Lampung Regency, totaling 43 individuals. Given the manageable population size, a total sampling technique was applied to ensure comprehensive data representation from the entire target group. This strategy enhanced the validity of the findings and reduced the risk of sampling bias.

The data collection instrument used was a structured Likert-scale questionnaire, which had been previously validated through expert judgment and pilot testing. The questionnaire consisted of four main sections: (1) items measuring perceptions of principal leadership, (2) items assessing teacher readiness in implementing the Independent Curriculum, (3) items related to the availability and adequacy of learning infrastructure, and (4) items evaluating the level of curriculum implementation. Each item was rated on a 4-point scale ranging from "Strongly Disagree" to "Strongly Agree."

To ensure the reliability and validity of the instrument, the study conducted item analysis and reliability testing prior to full deployment. Internal consistency was assessed using Cronbach's Alpha, with all subscales exceeding the acceptable threshold of 0.70. Validity was confirmed through item-total correlation and expert review, ensuring content and construct appropriateness aligned with the study objectives.

Data were analyzed using multiple regression analysis, specifically employing the Analysis of Variance (ANOVA) technique to determine the simultaneous effect of the independent variables on the dependent variable. This statistical approach allowed the researcher to determine both the individual and collective contributions of each predictor variable. The significance level was set at $p < 0.05$, with supporting statistical outputs including coefficient of correlation (r), determination coefficient (R^2), and F-test values. All statistical analyses were conducted using SPSS software, which enabled comprehensive examination of assumptions, such as normality, linearity, and multicollinearity. These diagnostic tests confirmed that the data met the required assumptions for regression analysis, allowing the interpretation of findings to be made with confidence regarding their statistical validity.

RESULT

This section presents the findings of the study based on the analysis of data collected from 43 Physical Education teachers in public senior high schools throughout Central Lampung Regency. The analysis was conducted using descriptive statistics, Pearson correlation analysis, and multiple regression analysis to examine both individual and combined effects of principal leadership, teacher readiness, and infrastructure on the implementation of the Independent Curriculum.

Table 1. Descriptive Statistics of Study Variables

Variable	Minimum	Maximum	Mean	Std. Deviation
Principal Leadership (X1)	72	118	97.33	10.06
Teacher Readiness (X2)	56	116	90.42	12.86
Learning Infrastructure (X3)	38	100	72.88	15.51
Curriculum Implementation (Y)	60	130	102.91	14.76

The descriptive analysis indicates that participants perceived each of the key variables at a high level. The mean score for principal leadership was 97.33, suggesting that teachers generally viewed their school leaders as effective in supporting curriculum implementation. Teacher readiness was also high, with a mean of 90.42, reflecting a relatively strong level of preparedness among Physical Education teachers. Learning infrastructure, although lower than the other variables, had a mean of 72.88, implying that while sufficient in general, some schools still experience shortages in physical education facilities. The mean for curriculum implementation was 102.91, indicating a relatively successful execution of the Independent Curriculum across participating schools.

Table 2. Pearson Correlation Coefficients

Independent Variable	r-value	p-value	Interpretation
Principal Leadership (X1)	0.972	0.000	Very Strong
Teacher Readiness (X2)	0.956	0.000	Very Strong
Learning Infrastructure (X3)	0.667	0.000	Moderate to Strong

The correlation results reveal that all independent variables have statistically significant relationships with the dependent variable (curriculum implementation). The strongest correlation was found between principal leadership and curriculum implementation ($r = 0.972$, $p < 0.001$), indicating that strong leadership is a critical driver in the success of the Independent Curriculum. Teacher readiness also showed a very strong correlation ($r = 0.956$, $p < 0.001$), which suggests that well-prepared teachers are better able to translate curriculum objectives into classroom practice. Learning infrastructure, while slightly weaker, still demonstrated a statistically significant relationship ($r = 0.667$, $p < 0.001$), indicating that adequate facilities play an important but relatively smaller role in supporting curriculum implementation.

Table 3. Model Summary and ANOVA

Model	R	R^2	Adjusted R^2	F	Sig.
Regression	0.984	0.968	0.966	422.766	0.000

The results of the regression analysis reveal that 96.8% of the variance in curriculum implementation is explained by the three predictor variables combined ($R^2 = 0.968$). This indicates a very high explanatory power of the model. The F-test value of 422.766 ($p < 0.001$) further confirms that the regression model is statistically significant and that the independent variables jointly influence the implementation of the Independent Curriculum. This finding demonstrates that leadership, teacher readiness, and infrastructure work synergistically to shape curriculum success in Physical Education programs.

Table 4. Effective and Relative Contributions of Each Variable

Variable	Beta Coefficient	Effective Contribution (%)	Relative Contribution (%)
Principal Leadership (X1)	0.678	56.14	58.00
Teacher Readiness (X2)	0.593	35.33	36.50
Learning Infrastructure (X3)	0.244	5.33	5.50

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The analysis of effective and relative contributions highlights the dominance of principal leadership as the most influential variable, accounting for 56.14% of the total variance in implementation outcomes. This reinforces the idea that school principals play a pivotal role in guiding teachers, allocating resources, and fostering an environment conducive to curriculum reform. Teacher readiness ranks second with an effective contribution of 35.33%, emphasizing the necessity of competent, confident, and well-supported educators in delivering the Independent Curriculum. Meanwhile, learning infrastructure, although statistically significant, contributes a smaller portion (5.33%) to the overall implementation. This suggests that while infrastructure is important, its impact is amplified when combined with strong leadership and teacher competence.

DISCUSSION

The findings of this study confirm that principal leadership, teacher readiness, and learning infrastructure each play a statistically and practically significant role in the successful implementation of the Independent Curriculum in Physical Education. This supports the view that curriculum reform is not merely a top-down directive but a multidimensional process involving complex interdependencies between human resources, institutional structures, and environmental readiness (Mulyasa, 2022; Fullan, 2019).

The strongest predictor found in this study was principal leadership, which demonstrated a very high correlation with curriculum implementation ($r = 0.972$) and the largest effective contribution (56.14%). This aligns with the findings of Khaeruddin (2020) and Marlina et al. (2022), who emphasized that principals must serve not only as administrative managers but as instructional leaders who shape vision, build consensus, and support professional growth among teachers. In the Independent Curriculum framework, principals are expected to lead school transformation through supervision, innovation, and decision-making that reflects both local needs and national priorities (Kemendikbudristek, 2020).

Effective principals create a positive school culture that encourages continuous learning, peer collaboration, and teacher autonomy—conditions under which curriculum reform can thrive (Agustin et al., 2023; Hidayat et al., 2023). Conversely, weak leadership often leads to unclear directives, fragmented implementation, and teacher disengagement. This study reinforces that school-level leadership is not peripheral, but central to the successful implementation of education policies.

The second most influential factor was teacher readiness, which accounted for 35.33% of the variance in curriculum implementation. This corroborates the research of Sari and Andriyani (2022), and also supports findings by Nurcahyo (2022), which emphasized that curriculum readiness requires not just technical knowledge, but also emotional and adaptive capacity in facing changing pedagogical paradigms. Readiness includes familiarity with competency-based learning, mastery of assessment techniques aligned with higher-order thinking skills, and the ability to create active, student-centered learning environments.

In Physical Education, teacher readiness has additional dimensions: the ability to deliver movement-based, inclusive, and formative experiences that foster physical literacy, character, and teamwork (Ramadhani, 2021). Teachers lacking in training, access to updated materials, or pedagogical reflection often struggle to meet these expectations. As indicated in this study and prior literature, continuous, needs-based professional development is vital for enhancing teacher agency and curriculum fidelity.

The third variable, learning infrastructure, although contributing a smaller proportion (5.33%), remains vital. This is particularly relevant in Physical Education, where physical space, sports equipment, and safety standards are not optional but essential (Putra et al., 2023; Komalasari et al., 2022). In Central Lampung, many schools lack adequate sports fields or indoor facilities, and some reported damaged or insufficient equipment. These findings echo those of Syahputra (2020), who concluded that infrastructural inadequacies limit pedagogical creativity and student participation.

Importantly, the combined effect of the three variables accounted for 96.8% of the total variance in curriculum implementation. This is a remarkable indicator of how leadership, human capital, and enabling environments are interdependent, reinforcing systems theory in education (Fullan, 2019). For example, even the most committed teacher may underperform without leadership direction or proper resources. Likewise, strong leadership may fail to create impact if it is unsupported by teacher engagement or the material conditions for implementation. The synergistic interaction among the three variables provides a comprehensive picture of what it takes to make curriculum reform work—especially in disciplines that rely on practice-based, active learning like Physical Education.

The findings also validate several theoretical frameworks. First, they align with Glatthorn et al.'s (2018) theory of curriculum leadership, which positions principals as essential intermediaries between macro-level policy and micro-level instruction. Second, they support the "capacity-building model" proposed by Harris & Muijs (2005), where teacher empowerment, collaborative learning, and organizational structures coalesce to produce reform readiness.

From a practical standpoint, the results offer guidance to educational stakeholders and policymakers. Reform efforts should not treat leadership training, teacher upskilling, or facility provision as siloed programs. Instead, they must be integrated into a

single school improvement plan, aligned with the goals of the Independent Curriculum. For instance, school supervisors should be equipped to evaluate both pedagogical quality and infrastructural feasibility. Teachers should receive regular in-service training that links curriculum theory to real instructional practices. Principals should be incentivized not only on administrative compliance but on demonstrated instructional impact.

Additionally, the study reveals the challenge of regional disparity in Indonesia's decentralized education system. Although the Independent Curriculum is a national directive, its execution depends heavily on local conditions, including district-level funding, school governance, and teacher deployment. Rural or peri-urban schools such as those in Central Lampung often face structural constraints that urban schools may not. Therefore, equity-oriented reforms and differentiated assistance are crucial to closing the implementation gap (Kemendikbudristek, 2021).

In conclusion, this study contributes robust empirical evidence for an integrated, context-responsive model of curriculum implementation in Physical Education. It affirms that sustainable change demands leadership alignment, teacher readiness, and infrastructural adequacy—working in synergy rather than isolation. The findings extend the relevance of leadership and curriculum theory into the real-world application of Indonesia's education reform, offering a roadmap for how future implementation strategies can be better designed, monitored, and supported.

CONCLUSIONS

Based on the findings, the following conclusions can be drawn: (1) Principal leadership significantly influences the implementation of the Independent Curriculum in Physical Education, with the highest effective contribution among all variables examined. This underscores the importance of leadership development programs tailored to instructional leadership and curriculum management. (2) Physical Education teacher readiness also shows a strong positive relationship with curriculum implementation. Investment in continuous professional development, curriculum workshops, and pedagogical innovation training is essential to enhance teacher effectiveness in reform contexts. (3) Learning infrastructure, while less dominant, remains a critical supporting factor. Schools must ensure that facilities, equipment, and resources for Physical Education are adequate and equitably distributed, especially in rural or underfunded areas. (4) The combined effect of leadership, teacher readiness, and infrastructure accounts for nearly all the variance in implementation outcomes. This emphasizes that curriculum implementation is a systemic process requiring coherence across multiple organizational domains. (5) These findings have implications for educational policymakers, curriculum developers, and school administrators aiming to implement the Independent Curriculum more effectively, particularly in the domain of Physical Education. Future research may explore qualitative dimensions of implementation, including teacher beliefs, student perspectives, and contextual barriers.

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