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Impact Of Play-Based Instruction And Jigsaw On Learning Motivation And Physical Fitness In SMK Tanjungpinang

Encik Nurissan Aprian[1)], Umar Umar[2)✉], Damrah Damrah[3)], Nurul Ihsan[4)]
[1)] *Universitas Negeri Padang, Padang, Indonesia*
E-mail: encikaprian24@guru.smk.belajar.id
[✉2)] *Universitas Negeri Padang, Padang, Indonesia*
E-mail: umarkepel@fik.unp.ac.id
[3)] *Universitas Negeri Padang, Padang, Indonesia*
E-mail: damrah@fik.unp.ac.id
[4)] *Universitas Negeri Padang, Padang, Indonesia*
E-mail: nurulihsan@fik.unp.ac.id

✉ Correspondence Author

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Abstract
This study investigates the influence of learning methods and student motivation on participation in Physical, Sport, and Health Education (PJOK) at SMK N 1 Tanjungpinang. The impetus for this research stems from observations indicating a low level of physical fitness among the student body, potentially attributable to a variety of factors, including pedagogical approaches and motivational levels. This quasi-experimental study involved 36 participants, selected based on pre-defined criteria. Physical fitness was assessed using the TKJI instrument, while motivation data were collected via a questionnaire. Data analysis was performed using a two-way analysis of variance (ANOVA) with a 2x2 factorial design. The results of the study and data analysis showed that: 1) There is a difference in physical fitness of students who are given the playing and jigsaw methods with a Sig value of 0.016 <0.05. 2) There is an interaction between learning methods and motivation on physical fitness, the Sig value between learning strategies and coordination skills is 0.000 < 0.05. 3) There is a difference in the level of physical fitness between students who are given the playing method and the jigsaw method at high learning motivation with a Qcount value of 14.54 > Qtable 3.85. 4) There is a difference in the level of physical fitness between students who are given the playing method and the jigsaw method at low learning motivation with a Qcount value of -2.65 < Qtable 3.85.

INTRODUCTION

Education, as a systemic construct, comprises three fundamental elements: input (encompassing students and teachers as facilitators), process (involving the influence of environmental conditions and pedagogical tools), and output, representing the resultant impact. The intended output, within this context, unequivocally pertains to the intellectual advancement of the nation's youth, a principle explicitly enshrined in the Republic of Indonesia Law Number 20 of

2003, Chapter II, Article 3. This article delineates the function and objectives of national education as follows:

"National education functions to develop capabilities and shape the character and civilization of a dignified nation in order to enlighten the nation's life, aiming for the development of students' potential to become individuals who believe and are devoted to God Almighty, possess noble character, are healthy, knowledgeable, capable, independent, and become democratic and responsible citizens."

An interpretive analysis of the legislative mandate governing the national education system reveals that its function and objectives transcend purely cognitive and religious dimensions. Within a more holistic framework, national education carries the imperative to cultivate physically robust human resources, an aspect of physical health recognized as integral to national character formation. Physical Education, Sports, and Health, as an integrated curricular component, extends beyond mere physical activity, serving as a strategic conduit for instilling values of discipline, sportsmanship, and a health-conscious lifestyle (Laksmi et al., 2025).

PJOK constitutes a mandatory curricular element within Indonesia's formal education system, implemented comprehensively from elementary (SD) through senior vocational high schools (SMA/SMK). The compulsory inclusion of underscores the acknowledged significance of holistically developing the physical, cognitive, and affective domains of learners (Nababan, 2024). Through structured and purposeful physical activities, possesses the potential to instill values of health, fitness, and fundamental movement skills crucial for the formation of high-quality human capital (Bakhtiar et al., 2018).

Sussiana et al. (2019) posit that "Physical education is an inseparable part of education in general that influences the potential of students in cognitive, affective, and psychomotor aspects through physical activity." Physical education is thus defined as an educational process of an individual, both as a person and as a member of society, consciously and systematically executed through intensive physical activities to achieve enhanced physical abilities and skills, intellectual growth, and character formation. Consequently, the essence of physical education lies in a deliberate educational process facilitated by intensive physical engagement.

The implementation of the curriculum within formal educational settings represents a strategic intervention for enhancing the functional capacities of learners. Active participation in structured and appropriately measured activities facilitates the development of the cardiovascular system, augments muscular strength and endurance, and optimizes body flexibility. The development of these physical fitness attributes exhibits a positive correlation with the enhanced adaptive capacity of learners to the demands of both physical and cognitive tasks (Bausad & Setyawati, 2024).

Physical fitness assumes a pivotal role in supporting the academic success of vocational high school (SMK) students and preparing them for the rigors of the workforce. Optimal levels of physical fitness are positively associated with improved concentration, endurance, and productivity, attributes particularly salient for SMK students who are frequently exposed to practical field experiences and heightened physical demands compared to their general high school counterparts. Furthermore, the establishment of active living habits through enhanced physical fitness contributes to the primary prevention of non- communicable diseases, mitigates the risk of injury, and enhances overall quality of life, ultimately fostering healthy, productive, and competitive SMK graduates (Al Ardha, 2022).

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Nurhasan, as cited in Marsanda and Kurniawan (2023), defines physical fitness as "an individual's ability to perform daily activities optimally and even perform additional activities without experiencing significant fatigue." An elevated level of physical fitness consequently enhances an individual's physical performance capabilities, rendering the body less susceptible to fatigue and ensuring that the execution of daily activities is not impeded.

METHODS

Employing a quasi-experimental design, this study investigated the effects of play- based and jigsaw methodologies, alongside learning motivation, on physical fitness enhancement among students at SMK Negeri 1 Tanjungpinang. A 2x2 treatment by level factorial design was implemented. Following ethical approval, the research was conducted over approximately eight weeks, comprising sixteen sessions. Data collection transpired at the SMK Negeri 1 Tanjungpinang field between August and October 2025. The target population encompassed all 185 eleventh-grade students (second semester, 2022/2023 academic year). Purposive sampling selected class XI.1 (n=36). A pre-test established baseline data, followed by stratified assignment to two experimental groups (n=18 each) utilizing an A-B-B-A counterbalanced design.

In Physical Education, Sport, and Health curricula, the evaluation of student learning outcomes is conducted periodically, encompassing cognitive, affective, and psychomotor domains. For this purpose, performance tests, specifically skill tests assessing motor proficiency, are employed as the primary assessment technique. The TKJI physical fitness test battery is utilized for elementary school students aged 16 to 19 years. To supersede prior data analysis techniques and hypothesis determination in this study, a two-way Analysis of Variance (ANOVA) statistical formula will be applied. This signifies the suitability of Two- Way ANOVA for testing hypotheses that posit mean differences across experimental groups, employing a two-factorial or level-based approach within both experimental and comparative causal research designs. Prior to conducting the Two-Way ANOVA, assessments of data normality and homogeneity will be performed.

RESULT AND DISCUSSION

The following provides a summarized account of the principal results yielded by the researcher's study, which focused on evaluating the physical fitness levels and related attributes of students attending SMK 1 Tanjung Pinang. These findings offer a condensed overview of the observed physical condition of the student cohort

a. Based on the investigator's prior research on physical fitness variations among SMKN 1 Tanjungpinang students exposed to play-based and jigsaw methods, findings revealed superior physical fitness in the play-based group ($p=0.016<\alpha=0.05$), empirically supporting the study's hypothesisThe statistical analysis concerning the second hypothesis, which explored the interaction between learning method and students' physical fitness, yielded a significant interaction effect (Sig. = 0.000, $p<0.05$), thereby rejecting the null hypothesis and supporting the alternative hypothesis that a statistically significant interaction exists between these variables within the studied student population.
b. Drawing upon the research outcomes, the mean physical fitness score for highly motivated students instructed via the play-based method (M = 18.89) significantly surpassed that of their counterparts taught with the jigsaw method (M = 15.44), as evidenced by a statistically significant Q-value (Qhitung = 14.54 > Qtabel = 3.89), thus supporting the hypothesized

superiority of the play-based intervention for this cohort.

c. Based on the empirical outcomes of this study, the mean physical fitness score for students with low motivation instructed via the play-based method (A1B2) was 16.22, while those receiving the jigsaw approach (A2B2) scored 15.33 (A1B2 < A2B2). The Q-statistic (- 2.65) was lower than the critical Q-value (3.89), supporting the hypothesis of a significant difference in object control skills favoring the jigsaw method for low-motivation students.

Discussion

The findings of this research corroborate the initial hypothesis, demonstrating a significant difference in the impact of play-based and jigsaw methods on the physical fitness levels of students at SMK N 1 Tanjungpinang. The implementation of play-based methodologies within physical education pedagogy has long garnered scholarly attention within the field of sports science (Farias et al., 2022). A substantial body of research indicates the considerable potential of this approach in enhancing various components of students' physical fitness. Aligning with the perspectives of Piaget and Vygotsky, as cited in Gray et al. (2017), play is posited as a naturalistic avenue for children's learning and development. Within the context of physical education, play transcends mere physical activity, functioning as a pedagogical process that integrates cognitive, affective, and psychomotor domains (Brinci et al., 2020; Santos, 2023). Through engagement in play, students intuitively execute complex movement patterns, a phenomenon elucidated by motor learning theories. This facilitates the development of fundamental and specific motor skills, establishing a crucial foundation for more intricate physical endeavors in the future.

Within sports pedagogy, the comparative examination of play-based and jigsaw methodologies has become a salient area of scholarly inquiry, aligning with educational theories emphasizing authentic and contextually relevant student learning experiences (Kumar et al., 2019; AlAli, 2024), fostering both motor competence and cognitive skills like problem-solving and creativity.

Within sports science, scholars highlight play's potential to cultivate engaging and motivating learning environments, fostering active student participation (Dyson et al., 2004). Leveraging self-determination theory (Deci & Ryan), intrinsic motivation from play promotes sustained physical activity (Stolz & Pill, 2014), while inherent social interactions nurture cooperation, sportsmanship, and empathy (Fizi et al., 2023).

Play-based learning's inherent adaptability facilitates students' progressive knowledge construction and strategic adjustments to diverse contexts. This pedagogical approach demonstrates a considerable capacity for fostering enjoyable, challenging, and meaningful learning environments, particularly in sports education. Consequently, it contributes to both physical fitness enhancement and students' holistic development, aligning with broader physical education objectives. Conversely, the jigsaw cooperative model effectively promotes active student engagement and learning outcomes (Huang et al., 2014; Tran & Lewis, 2012), presenting significant potential for elevating physical fitness levels in physical education through heterogeneous group formation and interdependent tasks that cultivate mutual reliance and stimulate intrinsic motivation via positive social interactions (Huang et al., 2008) The incorporation of diverse physical activities across the stages of the jigsaw learning paradigm is crucial for its efficacy in augmenting student physical fitness (O'Leary et al., 2015; Legrain et al., 2019). Existing literature substantiates that consistent and structured physical engagement yields

improvements in fitness components, including cardiorespiratory endurance, muscular strength, and flexibility (Seco et al., 2013; Dasso, 2019). The jigsaw approach facilitates not only the acquisition of exercise technique knowledge but also provides avenues for direct experiential application within a collaborative group context. Furthermore, the cooperative milieu fostered by the jigsaw method can promote peer encouragement and constructive competition in the pursuit of defined fitness objectives (Casey & Goodyear, 2015), aligning with task-based learning principles that underscore the significance of active student involvement.

This study aims to explore the complex interrelationships between pedagogical strategies, intrinsic motivation, and physical fitness outcomes among students at SMK N 1 Tanjungpinang. The interaction of these constructs represents a salient concern within sports education research. From a sports pedagogical standpoint, innovative and varied instructional modalities extend beyond mere information dissemination, serving as catalysts for enhancing active student participation in physical activity (Ferrari, 2009). This sustained engagement, consequently, contributes to the enhancement of students' physical fitness profiles

Drawing from contemporary sports education paradigms emphasizing autonomy and competence in motor learning, educational psychology underscores motivation's pivotal role. Deci and Ryan's (2000) self-determination theory offers a robust framework elucidating how intrinsic motivation, encompassing autonomy, competence, and relatedness, influences individual behavior (Teixeira et al., 2012). Within sports education, heightened motivation, marked by curiosity, interest, and perceived challenge, strongly predicts sustained engagement and optimal outcomes (Abuhamdeh & Csikszentmihalyi, 2013). Sport psychology research consistently reveals a positive nexus between motivation and diverse aspects of student development, including physical fitness, motor skills, and psychological well-being (Zheng et al., 2023; Latino et al., 2024). Consequently, pedagogical approaches addressing students' psychological needs, notably autonomy and competence, are hypothesized to more effectively foster and maintain motivation toward physical activity. Student-centered methodologies, affording choice, goal-setting, and constructive feedback, are deemed promising for bolstering intrinsic motivation in sports education.

CONCLUSIONS

Based on the aforementioned findings, several key conclusions can be drawn regarding the impact of teaching methodologies and motivation on students' physical fitness. Firstly, a statistically significant difference (Sig=0.016<0.05) was observed in the overall physical fitness levels between students instructed using the play-based method and those using the jigsaw method. Specifically, the play-based approach yielded superior physical fitness outcomes compared to the jigsaw method. Secondly, a significant interaction (Sig=0.000<0.05) was identified between the teaching method and student motivation concerning their physical fitness. This indicates that the effectiveness of each method varied depending on the students' level of motivation. Further analysis revealed a significant difference (Qhitung=14.54>Qtabel=3.85) in physical fitness levels between the two instructional methods among students with high learning motivation. In this group, the play- based method resulted in significantly better physical fitness compared to the jigsaw method. Conversely, among students with low learning motivation, a different trend emerged. While the difference was not statistically significant (Qhitung=−2.65<Qtabel=3.85), the findings suggest that the jigsaw method was associated with slightly better physical fitness levels compared to the play-based

method in this subgroup. These conclusions highlight the complex interplay between pedagogical approaches and motivational factors in influencing students' physical fitness.

CONFLICTS OF INTEREST STATEMENT

Regarding this study, the author declares that there is no conflict of interest.

AUTHOR CONTRIBUTIONS

Study concept and design: Encik Nurissan Aprian. Acquisition of data: Umar Umar. Analysis and interpretation of data: Damrah Damrah. Drafting the manuscript: Encik Nurissan Aprian. Critical revision of the manuscript for important intellectual content: Nurul Ihsan. Statistical analysis: Encik Nurissan Aprian.

REFERENCES

Abuhamdeh, S., & Csikszentmihalyi, M. (2012). The importance of challenge for the enjoyment of intrinsically motivated, goal-directed activities. *Personality and social psychology bulletin*, *38*(3), 317-330. https://doi.org/10.1177/0146167211427147

AlAli, R. (2024). Enhancing 21st century skills through integrated STEM education using project-oriented problem-based learning. *Geo Journal of Tourism and Geosites*, *53*(2), 421-430. DOI 10.30892/gtg.53205-1217

Al Ardha, M. A. (2022). Inovasi digital learning pada mata pelajaran pendidikan jasmani, olahraga, dan kesehatan (PJOK). *Teknologi Metaverse Dalam Ilmu Keolahragaan*, 39- 45.

Bausad, A. A., & Setyawati, H. (2024, December). Tren Penelitian Dan Produktivitas Bidang Pendidikan Jasmani Di Indonesia: Analisis Bibliometrik. In *Prosiding Seminar Nasional Pendidikan Jasmani dan Kesehatan Mental Peserta Didik* (pp. 64-85).

Birinci, Y. Z., Korkmaz, N. H., & Ozturk, I. E. (2020). Can Exergames use as an educational tool in Physical education for cognitive, social and affective domains. *International journal of scientific and technological research*, *6*, 151-166. DOI: 10.7176/JSTR/6-06-11

Casey, A., & Goodyear, V. A. (2015). Can cooperative learning achieve the four learning outcomes of physical education? A review of literature. *Quest*, *67*(1), 56-72. https://doi.org/10.1080/00336297.2014.984733

Dasso, N. A. (2019, January). How is exercise different from physical activity? A concept analysis. In *Nursing forum* (Vol. 54, No. 1, pp. 45-52). https://doi.org/10.1111/nuf.12296

Dyson, B., Griffin, L. L., & Hastie, P. (2004). Sport education, tactical games, and cooperative learning: Theoretical and pedagogical considerations. *Quest*, *56*(2), 226- 240. https://doi.org/10.1080/00336297.2004.10491823

Farias, C., Teixeira, J., Ribeiro, E., & Mesquita, I. (2022). Effects of a two-stage physical education teacher education programme on preservice teachers' specialised content knowledge and students' game-play in a student-centred sport education-step game approach. *European Physical Education Review*, *28*(3), 816-834. https://doi.org/10.1177/1356336X221084516

Ferrari, A., Cachia, R., & Punie, Y. (2009). Innovation and creativity in education and training in the EU member states: Fostering creative learning and supporting innovative teaching. *JRC Technical Note*, *52374*, 64.

Fizi, R. M., Winarni, S., & Hartanto, A. (2023). A game model in physical education to improve motor skills, cooperation, and discipline of primary school learners. *Pedagogy of Physical Culture and Sports*, *27*(6), 448-455. https://doi.org/10.15561/26649837.2023.0602

Gray, P. (2017). What exactly is play, and why is it such a powerful vehicle for learning?. *Topics in Language Disorders*, *37*(3), 217-228. DOI: 10.1097/TLD.0000000000000130

Huang, Y. M., Huang, T. C., & Hsieh, M. Y. (2008). Using annotation services in a ubiquitous Jigsaw cooperative learning environment. *Journal of Educational Technology & Society*, *11*(2), 3-15.

Huang, Y. M., Liao, Y. W., Huang, S. H., & Chen, H. C. (2014). Jigsaw-based cooperative learning approach to improve learning outcomes for mobile situated learning. *Journal of Educational Technology & Society*, *17*(1), 128-140.

Kumar, S., Martin, F., Budhrani, K., & Ritzhaupt, A. (2019). Award-winning faculty online teaching practices: Elements of award-winning courses. *Online learning*, *23*(4), 160- 180.

Laxsmi, I. G. A. M., Nuryaganiy, H. P., & Suwiwa, I. G. (2025). Mengenal Dasar-Dasar Penjas (Sejarah, Konsep, Dan Manfaatnya). *Integrative Perspectives of Social and Science Journal*, *2*(01 Februari), 210-217.

Latino, F., Romano, G., & Tafuri, F. (2024). Physical Education Teacher's Continuing Professional Development Affects the Physiological and Cognitive Well-Being of School-Age Children. *Education Sciences*, *14*(11), 1199. https://doi.org/10.3390/educsci14111199

Legrain, P., Escalié, G., Lafont, L., & Chaliès, S. (2019). Cooperative learning: a relevant instructional model for physical education pre-service teacher training?. *Physical Education and Sport Pedagogy*, *24*(1), 73-86. https://doi.org/10.1080/17408989.2018.1561838

Marsanda, P., & Kurniawan, A. (2023). Analisis Tingkat Kebugaran Jasmani pada Siswa kelas X MAN 1 Tanjung Jabung Barat. *Cerdas Sifa Pendidikan*, *12*(1), 49-63. https://doi.org/10.22437/csp.v12i1.26244

O'Leary, N., Wattison, N., Edwards, T., & Bryan, K. (2015). Closing the theory–practice gap: Physical education students' use of jigsaw learning in a secondary school. *European Physical Education Review*, *21*(2), 176-194. https://doi.org/10.1177/1356336X14555300

Santos, O. C. (2023). Beyond cognitive and affective issues: Designing smart learning environments for psychomotor personalized learning. In *Learning, Design, and Technology: An International Compendium of Theory, Research, Practice, and Policy* (pp. 3309-3332). Cham: Springer International Publishing.

Seco, J., Abecia, L. C., Echevarría, E., Barbero, I., Torres-Unda, J., Rodriguez, V., & Calvo, J. I. (2013). A long-term physical activity training program increases strength and flexibility, and improves balance in older adults. *Rehabilitation Nursing Journal*, *38*(1), 37-47. DOI: 10.1002/rnj.64

Stolz, S., & Pill, S. (2014). Teaching games and sport for understanding: Exploring and reconsidering its relevance in physical education. *European Physical Education Review*, *20*(1), 36-71. https://doi.org/10.1177/1356336X13496001

Susiana, R., Pradana, D., & Juntara, P. E. (2019). Transformasi Nilai melalui Pembelajaran Pendidikan Jasmani dalam Pembentukan Karakter Siswa Abad 21. *SEMNASFIP*.

Teixeira, P. J., Carraça, E. V., Markland, D., Silva, M. N., & Ryan, R. M. (2012). Exercise, physical activity, and self-determination theory: a systematic review. *International journal of behavioral nutrition and physical activity*, *9*, 1-30. https://doi.org/10.1186/1479-5868-9-78

Tran, V. D., & Lewis, R. (2012). The Effects of Jigsaw Learning on Students' Attitudes in a Vietnamese Higher Education Classroom. *International Journal of Higher Education*, *1*(2), 9-20.

Zheng, W., Shen, H., Belhaidas, M. B., Zhao, Y., Wang, L., & Yan, J. (2023). The relationship between physical fitness and perceived well-being, motivation, and enjoyment in Chinese adolescents during physical education: a preliminary cross- sectional study. *Children*, *10*(1), 111. https://doi.org/10.3390/children10010111