

Pupils' Awareness and Acceptance of Traditional Sports: An Assessment from an Intervention Trial in Schools in Northwest Vietnam

Nguyen Ba Diep¹, Nguyen Thi Ha², Le Xuan Diep³

¹Tay Bac University

²Hanoi Pedagogical University 2

HOW TO CITE:

Nguyen Ba Diep, Nguyen Thi Ha, Le Xuan Diep (2026). Pupils' Awareness and Acceptance of Traditional Sports: An Assessment from an Intervention Trial in Schools in Northwest Vietnam. *International Journal of Special Education*, 41(10s), 291-299

COPYRIGHT STATEMENT:

Copyright: © 2026 Authors.
Open access publication under the terms and conditions of the Creative Commons Attribution (CC BY) license (<http://creativecommons.org/licenses/by/4.0/>).

ABSTRACT:

Pupils' physical activity participation (PA) is declining, while traditional sports remain largely unaccepted. This study aims to assess the acceptance and effectiveness of an educational intervention program tailored to the local cultural context in Northwest Vietnam. A controlled experimental study design was used with 1060 Pupils from 14 schools. Pre- and post-intervention data were collected using a 5-point Likert scale for perception and attitude/reception. Before the intervention, the level of acceptance was predominantly "normal" (44.15%), with no significant difference between the experimental and control groups ($p=0.732$). Following the intervention, the experimental group showed a significant increase in the percentage of pupils who were "very active" (21.32%) and "active" (38.68%), higher than the control group (13.21% and 28.11%), with the mean value increasing compared to the control group ($p<0.001$). The effectiveness of the intervention did not differ by gender and grade level. The integrated educational intervention program enhanced pupils' awareness and acceptance of traditional sports, demonstrating its potential for widespread application in Physical Education (PE) linked to cultural factors..

Keywords: Traditional sports, school intervention, pupils, acceptance level, physical activity, Vietnam.

1. Introduction

In the current trend of rapid modernization, changes in lifestyle related to the physical activity (PA) behavior and amount of physical activity among children and adolescents have become a health issue that needs attention (Su et al., 2024). Many studies have shown that inactivity among school-aged children leads to symptoms of overall health decline and the formation of long-term lifestyle habits (Sallis et al., 2000; Hagger et al., 2002; Hagger et al., 2022). For this group, the professional view is that schools are an important

and optimal environment for implementing plans to enhance awareness of the role of PA and change lifestyles towards a more active and positive approach for students (Bauman et al., 2012; Wang & Wang, 2015).

Traditional sports are an important component of sports and are considered a cultural heritage of people, reflecting the cultural characteristics and people of each region and locality. Traditional sports are also defined as folk practices passed down through various forms, effective in physical development, and possessing significant value in

preserving regional cultural identities. However, with the development of information technology and the trend of global integration, people's and society's interest in traditional sports has decreased (Wan et al., 2024). For students, limitations in awareness and a less positive educational context related to traditional sports may be the reasons for reduced interest and limited acceptance of this field. Meanwhile, pupils' motor behavior has also been shown to be a composite result influenced by cognitive factors, attitudes, and behavioral intentions (Hagger et al., 2002; Trost et al., 2002).

According to the Theory of Planned Behavior (TPB) in humans, pupils' PA behavior is related to cognition, learned habits, and self-efficacy (Hagger & Hamilton, 2025). Mechanistically, TPB identifies that behavioral change often begins with changes in cognition and attitude, which then form intentions and lead to actual behavior (Ajzen I., 1991). Therefore, to change motor and cognitive behavior related to a positive lifestyle for pupils, the school is identified as the optimal context for approach (Dobbins et al., 1991; Wang & Zhang, 2016).

Although numerous research reports have been published on PA interventions in schools, most focus on modern physical activity interventions. This situation also exists in Vietnam, a country with many traditional sports. While the effectiveness of PA and physical behavior development plans is found to depend significantly on the characteristics of the target population and their suitability to cognitive and cultural factors (Bauman et al., 2012; World Health Organization, 2020), the development of traditional sports for pupils through schools requires empirical studies tailored to the educational conditions and realities of each region.

Based on the perspectives presented, this study aims to assess pupils' awareness and acceptance of traditional sports, and to determine the effectiveness of an intervention program implemented in a school context in the Northwest region of Vietnam. The main research problems were identified as: 1) Assessing the

level of acceptance of traditional sports among the pupils participating in the study; 2) Examining the cognitive effectiveness of implementing traditional sports interventions into school educational goals.

2. Methodology

Research Design

The study was conducted using an experimental, controlled intervention design, in which target groups were randomly selected from schools to mitigate the effects of local cognitive factors and ensure accurate evaluation of effectiveness on a regional scale (Wang & Wang, 2015). Participating schools were randomly assigned (according to school identifiers) and equivalence ($p > 0.05$ of mean values from pupil numbers, gender disparity, and gender-specific physical fitness) to two groups: experimental and control groups.

Subjects and Sample

The number of pupils participating in the study was 1060 from 14 junior and senior high schools in the Northwest region of Vietnam. Each school had 2-3 classes, averaging approximately 75 pupils per school. The number of pupils per school ensured relative uniformity in terms of quantity and gender. The number of pupils in the junior high school level was 532, and in the senior high school level was 528. The number of students in each grade level was standardized and ranged from approximately 140 to 165. Furthermore, the gender ratio was adjusted to ensure equivalence overall and within each school to align with recommendations from studies on adolescent motor behavior (Sallis et al., 2000; Dishman et al., 2004).

Schools were randomly selected and distributed by region into two groups: experimental group (7 schools, $n=530$) and control group (7 schools, $n=530$).

The selection criteria for pupils participating in the study were: 1) Being pupils currently enrolled in the selected grades; 2) Belonging to grades 6-12; 3) Having completed all required data; 4) Having normal health and physical condition,

and possessing basic PA skills. 5) Voluntary participation in the study (with confirmation from the homeroom teacher or family for pupils in the lower secondary level). Exclusion criteria include: 1) Lack of research data; 2) Lack of active participation or a PE subject score ≤ 5.0 points.

Intervention Content and Process

The intervention program is designed to enhance pupils' awareness and acceptance of traditional sports integrated into the prescribed PE curriculum (approved and agreed upon by the local Education Department and school administrators). Specific intervention content includes: 1) Providing knowledge about the cultural value and benefits of traditional sports; 2) Organizing hands-on experiential activities (50 minutes/week, 2 sessions/week) related to the local characteristic traditional sports; 3) Integrating elements that encourage active participation. The integrated motor behaviors involving traditional sports were appropriately calculated to influence the motor behavior of participating pupils (Bauman et al., 2012; Dobbins et al., 2013); while also meeting recommendations for school PE goals (Su et al., 2024; Xie et al., 2025).

In this trial, the intervention was conducted during the first semester of the 2025-2026 school year. The intervention process involved the consent and support of PE administrators and teachers at the participating schools.

Methods of assessing study subjects

The study used three main groups of scales: 1) Perception; 2) Attitude/Reception; 3) Behavioral intention towards traditional sports. The scales were constructed based on theoretical foundations and tools used in previous studies on motor behavior in children and adolescents (Sallis et al., 2000; Hagger et al., 2002).

The attitude and behavioral intention scales were developed in line with the TPB approach, reflecting the relationship between cognition, attitude, and behavioral tendencies (Ajzen I., 1991).

All scales in the study were constructed as 5-point Likert scales, appropriate to the cognitive abilities of the participating pupils. Before conducting the formal survey, the tools were tested on a small sample to refine the language and ensure the clarity of the questions. The intrinsic reliability of the scales was assessed through Cronbach's alpha coefficient, with results of 0.82 for the cognitive scale, 0.85 for the attitude/reception scale, and 0.80 for the behavioral intention scale. These values all exceeded the acceptable threshold (≥ 0.70), indicating that the scales achieved good reliability in behavioral research (Sallis et al., 2000; Hagger et al., 2002).

Data Analysis Method

Research data were collected using Excel 2019 and processed using SPSS 22.0 with basic descriptive statistics including: frequency, percentage, mean, and standard deviation. To compare differences between groups before and after intervention, the study used the Chi-square test for categorical variables and the mean difference test for continuous variables. The size of the effect is reported through indices such as Cramér's V and Cohen's d to assess the actual magnitude of the effect (Wan et al., 2024). To assess the impact of the intervention over time and control for confounding factors, the study used a hierarchical logistic regression model with an ordinal dependent variable, consistent with the nature of Likert data (World Health Organization, 2020). Simultaneously, repeated-entry analysis of the results was performed.

This is consistent with the mixed-effects model applied to examine pre- and post-experimental changes along with controlling for cluster effects of schools (Wang & Wang, 2015). Statistical significance was determined at $p < 0.05$.

3. Results

The current state of acceptance of traditional sports before intervention

To determine the initial acceptance level of pupils towards traditional sports during the intervention, the study conducted a distribution

analysis by experimental and control groups before the intervention was implemented.

Table 1. Acceptance level of traditional sports before intervention by group (n=1060)

Level	Experimental Group (n=530)	Control Group (n=530)	Σ (%)	95% CI	χ^2	p	V
Very positive	64 (12.08%)	63 (11.89%)	11.98	10.10–13.96	0.62	0.732	0.02
Positive	146 (27.55%)	143 (26.98%)	27.26	24.62–29.90			
Normal	231 (43.58%)	237 (44.72%)	44.15	41.18–47.12			
Not positive	89 (16.79%)	87 (16.41%)	16.61	14.36–18.86			

Note: The scale is coded in ascending order: 1=not positive; 2=normal; 3=positive; 4=very positive; The overall mean value of the experimental group = 2.35 ± 0.86 , control group = 2.34 ± 0.85 ; Chi-square test showed no statistically significant difference between the two groups before intervention.

The results show that the students' level of acceptance was mainly at the normal level (=44.15%), while the proportion of "very positive" was low (=11.98%). Comparison between the two groups showed no statistically significant difference ($\chi^2=0.62$; $p \geq 0.05$; $V=0.02$), with the proportions at each level being almost equivalent. The overall mean value obtained ($=2.35 \pm 0.86$) also indicates an average level of acceptance.

Analysis of Factors Influencing Acceptance Levels

To assess the impact of the intervention on acceptance levels, the study used a hierarchical logistic regression model, while controlling for individual factors such as gender and educational level.

Table 2. Effects of intervention on acceptance levels

Variable	β (SE)	OR	95% CI	p
Group (Experimental Group)	0.76 (0.09)	2.14	1.78–2.57	<0.001
Time (Post-test)	0.28 (0.07)	1.32	1.15–1.52	<0.001
Group $\times$ Time	1.05 (0.11)	2.87	2.31–3.56	<0.001
Gender	0.05 (0.06)	1.05	0.92–1.20	0.421
Education level	−0.06 (0.07)	0.94	0.82–1.08	0.338

Note: The model is statistically significant (Likelihood Ratio $\chi^2=236.45$; $p<0.001$), with a mean explanatory power (Nagelkerke $R^2=0.182$) and a correct classification rate of 64.8%.

The results show that the interaction variable between the experimental group and the time point after intervention is highly statistically significant (OR=2.87; 95% CI: 2.31–3.56; $p<0.001$), indicating that the intervention significantly increased students' ability to transition from a cognitive level to a receptive level. In addition, the group factor (OR=2.14;

$p<0.001$) and time point (OR=1.32; $p<0.001$) also indicate a positive influence.

Conversely, control variables such as gender and grade level were not statistically significant ($p>0.05$), indicating relatively uniform intervention efficacy among pupil groups. The model has a good fit (Nagelkerke $R^2=0.182$),

suggesting moderate explanatory power in this case study.

Comparison of Acceptance Levels Between the Two Groups After Intervention

The study compared the acceptance levels between the experimental and control groups after the intervention experiment to assess the differences.

Table 3. Post-intervention comparison (descriptive + test + effect size combination)

Level	Experimental Group (n=530)	Control Group (n=530)	χ^2	p	V
Very positive	113 (21.32)	70 (13.21)	32.48	<0.001	0.18
Positive	205 (38.68)	149 (28.11)			
Normal	160 (30.19)	226 (42.64)			
Not positive	52 (9.81)	85 (16.04)			

Note: The overall mean value of the experimental group was 2.72 ± 0.81 , and the control group was 2.38 ± 0.84 . Cohen's $d=0.41$ - the effect size is moderate.

The results show that the experimental group showed significant improvement compared to the control group. The percentage of students achieving “very positive” and “positive” ratings in the experimental group were 21.32% and 38.68%, respectively, significantly higher than in the control group (=13.21% and 28.11%). Conversely, the percentage of “normal” and “not positive” ratings decreased significantly in the experimental group.

The χ^2 test showed a statistically significant difference ($\chi^2=32.48$; $p<0.001$), with a small to

moderate effect size ($V=0.18$). The mean value of the experimental group ($=2.72 \pm 0.81$) was significantly higher than that of the control group ($=2.38 \pm 0.84$), with an effect size of moderate (Cohen's $d=0.41$).

Changes in reception levels before and after intervention

To assess the extent of change over time, the study conducted repeated measures analysis combined with a mixed model to control for the effect of school clusters.

Table 4. Comparison of changes before and after the experiment

Group	$\bar{x} \pm SD$		Δ	p	d	η^2
	Pre-test	Post-test				
Experimental Group	2.35 ± 0.86	2.72 ± 0.81	+0.37	<0.001	0.44	0.16
Control Group	2.34 ± 0.85	2.38 ± 0.84	+0.04	≥ 0.05	0.05	

Note: Mixed model: $\beta=0.36$; $ICC=0.06$; the intervention effect is statistically significant.

The results show that the experimental group had a significant increase in reception level ($\Delta=+0.37$; $p<0.001$), while the control group showed no statistically significant change ($\Delta=+0.04$; $p \geq 0.05$). The effect size in the experimental group was moderate ($d=0.44$), while in the control group it was almost negligible.

Overall analysis showed that the intervention effect was statistically significant ($p<0.001$) with a relatively large impact in the educational context ($\eta^2=0.16$). The results from the mixed model further confirm the impact of the intervention ($\beta=0.36$; $p<0.001$), while also showing a low-to-medium cluster effect ($ICC=0.06$).

4. Discussion

The research results show that, before the intervention, the level of acceptance of traditional sports among pupils was generally at an average level, with the majority of pupils choosing the “normal” level. Furthermore, before the experiment, there were no statistically significant differences between the experimental and control groups, indicating that the two groups had similar starting points. Pre-experimental evaluation aims to ensure that the changes after intervention in the experimental group are substantiated (Sallis et al., 2000; Gao et al., 2025).

After the designed experimental intervention, the experimental group showed clear changes. The percentage of pupils in the experimental group who recorded a change in acceptance level shifted to positive and very positive. This change was observed from descriptive analysis, statistical testing, and regression modeling. The results showed a statistically significant interaction effect between the groups and the time period, indicating that the intervention did indeed create a difference over time between the two groups. Meanwhile, the control group showed no clear (descriptive) change. This result is consistent with review studies showing that school intervention programs can produce significant improvements in pupils' motor behavior (Bauman et al., 2012; Wang & Wang, 2015; Dobbins et al., 2013).

The above results are in agreement with behavioral theory, particularly TPB. According to this theory, the nature of each individual's behavior is influenced by perceptions, attitudes, and intentions (Ajzen I., 1991). In relation to this theory, this study suggests that the effectiveness of the intervention is related to increased pupils' awareness of the value and significance of national sports. As awareness improves, attitudes toward these types of activities also become more positive, thereby fostering a willingness to participate. It can also be said that the observed change is not merely a change in behavior but a sequential transition from awareness to behavior. This has been confirmed in several published reports (Hagger et al., 2002; Wang & Zhang, 2016). Furthermore, increased intrinsic

motivation and a sense of meaning in the activity can also play a significant mediating role, consistent with the perspective of self-determination theory (Lubans et al., 2016) and recommended integrated models (World Health Organization, 2020).

To consider this from a broader perspective within the context of school PE, motor behavior interventions often achieve relatively positive results for pupils (Bauman et al., 2012; Dobbins et al., 2013). This may be due to multiple contributing factors, both from general education and long-term, targeted intervention processes. For the results obtained from this study, the degree of change in the effect is consistent with the open approach in schools as mentioned above.

Another noteworthy point is that the study did not record significant differences by gender and grade level. Thus, the impact of the intervention can be identified as tending to be uniform across pupil groups (Dishman et al., 2004). Related to this, there is also a reported view that planned and long-term control in schools can produce stable intervention results across target groups such as pupils (Telama R., 2009).

In practical terms, the research results allow us to determine that traditional sports, when popularized, can also be considered a form of physical activity linked to local cultural characteristics. However, the current rapid modernization, coupled with cultural and entertainment integration, makes the development of activities related to these traditional cultural aspects challenging. Nevertheless, a shift in approach from schools towards a more appropriate direction is entirely feasible in changing the perceptions of the younger generation. This has lasting value in developing ethnic sports over longer-term plans. Furthermore, incorporating ethnic sports aligns with the view of encouraging increased positive physical activity (PA) (Su et al., 2024; Xie et al., 2025). Moreover, schools have been shown to be a more sustainable context for forming positive physical behavior compared to other environments (Wan et al., 2024).

Within the scope of this study, limitations were identified in several points: 1) The research data were obtained entirely from self-reported interviews with pupils; therefore, differences in personal perception and sentiment may lead to biases in the data and analysis results. This limitation is also noted in similar research reports (Hagger et al., 2002; Hagger et al., 2022; Telama R., 2009); 2) The experimental intervention period and post-study evaluation were not carried out. Thus, the results are only evaluated within the timeframe of the study, and the effectiveness of subsequent behavior is not determined. This limitation indicates a lack of information for applying the results after the research process (Hagger et al., 2002; Hagger et al., 2022); 3) Other influencing factors on perceptions of ethnic sports (context local sports culture, awareness of ethnic sports in the community, etc.), school conditions (physical facilities, teachers' views and perceptions, management of ethnic sports, etc.), development mechanisms from social management, schools or family living contexts, etc., have not yet been studied and evaluated. Some reports indicate that these factors all have a significant influence on pupils' awareness and physical activity behavior (Gao et al., 2025).

Based on the results obtained and the limitations mentioned above, future studies should consider increasing the intervention time and evaluating the effectiveness after intervention to determine the effectiveness of the research in practice. It is also necessary to consider using objective assessment methods (e.g., assessing physical

activity using electronic devices such as wristwatches for pupils) to increase the reliability of the test and analysis results. Furthermore, due to the unique characteristics of ethnic sports in each region, expanding the geographical scope of the study is necessary to determine the effectiveness of intervention programs in different contexts (Bauman et al., 2012; UNESCO, 2015).

5. Conclusion

The research results show that, before the intervention, the level of acceptance of traditional sports among pupils in the Northwest region of Vietnam was mainly at an average level (44.15%; 2.35 ± 0.86 ; $\chi^2=0.62$; $p=0.732$). This result indicates limited interest among pupils. After the intervention, students in the experimental group showed significant improvement compared to the control group, with the percentages of "very active" and "active" reaching 21.32% and 38.68% respectively, compared to 13.21% and 28.11%; the mean value increased to 2.72 ± 0.81 compared to 2.38 ± 0.84 ($\chi^2=32.48$; $p<0.001$; Cohen's $d=0.41$; $V=0.18$). The effectiveness of the intervention was confirmed by statistical analyses (OR=2.87; 95% CI: 2.31–3.56; $p<0.001$; $\beta=0.36$; $\eta^2=0.16$; $\Delta=+0.37$; $p<0.001$) and there were no differences by gender or grade level ($p>0.05$). In summary, the intervention program contributed to raising awareness and acceptance of traditional sports among pupils, and also demonstrated the feasibility of its application in school PE programs in this region.

References

- Ajzen I. (1991). *The theory of planned behavior*. Organizational Behavior and Human Decision Processes, 50(2), 179-211. [https://doi.org/10.1016/0749-5978\(91\)90020-T](https://doi.org/10.1016/0749-5978(91)90020-T)
- Bauman A.E., Reis R.S., Sallis J.F., et al (2012). *Correlates of physical activity: Why are some people physically active and others not?* The Lancet, 380(9838), 258-271. [https://doi.org/10.1016/S0140-6736\(12\)60735-1](https://doi.org/10.1016/S0140-6736(12)60735-1)
- Deci E.L., Ryan R.M. (2000). *The "what" and "why" of goal pursuits: Human needs and the self-determination of behavior*. Psychological Inquiry, 11(4), 227-268. https://doi.org/10.1207/S15327965PLI1104_01
- Dishman R.K., Motl R.W., Saunders R., et al (2004). *Self-efficacy partially mediates the effect of a school-based physical-activity intervention among adolescent girls*. American Journal of Preventive Medicine, 28(2), 177-183. <https://doi.org/10.1016/j.amepre.2004.10.007>

- Dobbins M., Husson H., DeCorby K., LaRocca R.L. (2013). *School-based physical activity programs for promoting physical activity and fitness in children and adolescents aged 6-18*. Cochrane Database of Systematic Reviews, (2), CD007651. <https://doi.org/10.1002/14651858.CD007651.pub2>
- Gao J., Nie Y., Guo M., et al. (2025). *Analysis of the association between adolescent physical activity and life satisfaction: A systematic review and meta-analysis*. BMC Psychology, 13, 738. <https://doi.org/10.1186/s40359-025-02847-1>
- Hagger M.S., Hamilton K. (2022). *General causality orientations in self-determination theory: Meta-analysis and test of a process model*. Psychological Bulletin, 148(9-10), 710-768. <https://doi.org/10.1037/bul0000383>
- Hagger M.S., Chatzisarantis N.L.D., Biddle S.J.H. (2002). *A meta-analytic review of the theories of reasoned action and planned behavior in physical activity*. Journal of Sport and Exercise Psychology, 24(1), 3-32. <https://doi.org/10.1123/jsep.24.1.3>
- Hagger M.S., Hamilton, K. (2025). *Progress on theory of planned behavior research: Advances in research synthesis and agenda for future research*. Journal of Behavioral Medicine, 48(1), 43-56. <https://doi.org/10.1007/s10865-024-00545-8>
- Lubans D.R., Richards J., Hillman C.H., et al (2016). *Physical activity for cognitive and mental health in youth: A systematic review of mechanisms*. The Lancet Psychiatry, 3(3), 239-252. [https://doi.org/10.1016/S2215-0366\(15\)00503-6](https://doi.org/10.1016/S2215-0366(15)00503-6)
- Sallis J.F., Prochaska J.J., Taylor W.C. (2000). *A review of correlates of physical activity of children and adolescents*. Medicine & Science in Sports & Exercise, 32(5), 963-975. <https://doi.org/10.1097/00005768-200005000-00014>
- Su D.L.Y., Wan A.W.L., Zhang L., et al (2024). *Predicting adolescents' leisure-time physical activity: A three-wave prospective test of an integrated model of self-determination theory and the theory of planned behavior*. Behavioral Sciences, 14(8), 693. <https://doi.org/10.3390/bs14080693>
- Telama R. (2009). *Tracking of physical activity from childhood to adulthood: A review*. Obesity Facts, 2(3), 187-195. <https://doi.org/10.1159/000222244>
- Trost S.G., Pate R.R., Sallis J.F., et al (2002). *Age and gender differences in objectively measured physical activity in youth*. Medicine & Science in Sports & Exercise, 34(2), 350-355. <https://doi.org/10.1097/00005768-200202000-00025>
- UNESCO (2015). *Quality physical education (QPE): Guidelines for policy-makers*. UNESCO Publishing.
- Wan J., Kim J., Tsujimoto T., et al (2024). *Effectiveness and components of health behavior interventions on increasing physical activity: A systematic review with meta-analyses*. Behavioral Sciences, 14(12), 1224. <https://doi.org/10.3390/bs14121224>
- Wang L., Wang L. (2015). *Using theory of planned behavior to predict the physical activity of children: Probing gender differences*. BioMed Research International, 2015, 536904. <https://doi.org/10.1155/2015/536904>
- Wang L., Zhang Y. (2016). *An extended version of the theory of planned behaviour: The role of self-efficacy and past behaviour in predicting the physical activity of Chinese adolescents*. Journal of Sports Sciences, 34(7), 587-597. <https://doi.org/10.1080/02640414.2015.1064149>
- World Health Organization (2020). *WHO guidelines on physical activity and sedentary behaviour*. WHO Press.
- Xie C., Zhang Z., Zhang X., et al (2025). *Effects of interventions on physical activity behavior change in children and adolescents: A systematic review*. BMC Public Health, 25, 657. <https://doi.org/10.1186/s12889-025-21336-z>

Funding source: This study was conducted within the framework of a Ministry-level science and technology project funded by the Ministry of Education and Training of Vietnam (Code: B2025-TTB-04), led by Tay Bac University. Funding for this research is provided by the state budget through the Ministry of Education and Training's scientific research program in Vietnam. The funding agency is not involved in the research design, data collection and analysis, or the writing and publication of the research paper.

Research Ethics: The research adheres to the ethical principles in social science and education research, and the scientific research procedures and oversight stipulated by Tay Bac University and the Ministry of Education and Training of Vietnam. Student participation is entirely voluntary, with informed consent from the participant and/or legal guardian. All participants are fully informed of the research process and procedures before confirming their participation. All data collected, processed, and stored are anonymous and confidential, and are used solely for this research. Before contacting the target subjects, this study was also approved by the management units (Department of Education) and schools where the experiments and surveys were conducted.

Conflict of Interest: The authors commit to having no conflict of interest related to this study

Acknowledgments: The authors would like to express their sincere gratitude to the Ministry of Education and Training of Vietnam and Tay Bac University for facilitating and approving the research process. They also thank the schools that agreed to participate in the study, the PE teachers who provided support, and the pupils who participated.

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

During the preparation of this work the authors didn't use of AI in the writing of the article