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Life Skills and Volleyball Teaching: Comparison Between TGfU and the Direct Instruction Model

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Abstract: The learning environment created by the physical education teacher, through the teaching model employed, can significantly influence students' engagement during lessons. Therefore, this study aimed to compare tactical-technical learning and students' self-perceptions of life skills between TGfU and direct instruction. The sample consisted of 67 students, aged between 13 and 15 years, enrolled in the ninth grade of a municipal public school, and the research design involved an intervention consisting of 18 sessions, each lasting 60 minutes. The results revealed no significant differences between the teaching models regarding tactical-technical variables ($p > 0.05$). However, concerning life skills, the TGfU/HVs group demonstrated higher mean teamwork scores than the Traditional group ($p = 0.008$). On the other hand, the Traditional and control groups achieved higher mean scores for goal-setting skills than the TGfU/HVs group ($p = 0.001$ for both cases). These findings highlight that the organization of sports practice, despite variations in teaching models, fosters the students' self-perceptions of life skills, underscoring the necessity of further research to deepen understanding of game-based pedagogies in school physical education. It is also imperative to reflect on implementing additional pedagogical practices in schools that align with institutional objectives and actively promote student learning.

Keywords: team sports; performance; constructivism; tactical-technical; learning

1. Introduction

Physical Education teaching in many schools focuses on the teacher, technical skills, and repetitive movement patterns, often failing to foster student motivation, particularly among those uncomfortable with sports (Ferraz et al., 2023; González, 2020). This traditional approach, rooted in direct instruction, places students as mere supporting actors in the teaching and learning process and needs to be rethought considering contemporary theories, especially student-centered ones (Alcalá & Garijo, 2017; Arufe-Giráldez et al., 2023; Pill et al., 2024).

In this context, contemporary methods have been designed to mitigate the negative aspects inherent in traditional approaches, such as the overemphasis on technique, the decontextualized teaching of game ecology, and the lack of student motivation in Physical Education classes (Arufe-Giráldez et al., 2023; González, 2020; Pill et al., 2024). The Teaching Games for Understanding (TGfU) approach emerged as a response, positioning the student at the center of the learning process and emphasizing cognitive processes such as perception, decision-making, and comprehension (Bunker & Thorpe, 1986). TGfU promotes learning in sports by prioritizing tactical and game understanding over technical skills (Alcalá & Garijo, 2017).

Originally grounded in constructivist principles, TGfU seeks to facilitate active knowledge construction, enabling meaningful learning opportunities and fostering social cooperation (Backes et al., 2023). Within this theoretical framework, knowledge is constructed through negotiation and reinterpretation of the world, allowing students to take responsibility for their meaningful learning

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by connecting prior knowledge with new insights through cooperative and group activities (Backes et al., 2022, 2023; Beni et al., 2021; Galvão et al., 2022).

Studies on teaching models reveal that both TGfU and Direct Instruction effectively enhance skills in controlled situations (Batez et al., 2021). TGfU, however, enables students to practice adapted versions of sports, promoting simultaneous learning of multiple aspects of a sport (Cocca et al., 2020). Moreover, TGfU positively impacts learning time, increases student engagement, and enhances their participation in the learning process (Indrayogi, 2021; Tangahu, 2019), contributing significantly to motivation and performance (Romadhona et al., 2024).

Despite its benefits, challenges still need to be overcome when adopting TGfU as a regular practice in Physical Education. Theory and research in this field often need to provide explicit or practical solutions for professionals' day-to-day work (Papagiannopoulos et al., 2023). Morales-Belando et al., 2022 emphasize that the effectiveness of TGfU depends on critical resources, including contextualized lesson planning, a minimum of twelve hours of instruction per unit, adequate teacher training, well-structured modified games (in terms of quantity, difficulty, and timing), and the inclusion of teacher questioning during activities.

Given the challenges of implementing this teaching method, there is a pressing need to integrate significant components from various teaching models, leading to what is known as pedagogical model hybridization (González-Víllora et al., 2019). Hybrid models incorporating TGfU have been shown to make sports teaching more engaging (Batez et al., 2021; García-González et al., 2020), enhancing students' perceived success in practice (Ortiz et al., 2023). Additionally, hybrid models that utilize TGfU help design more equitable and inclusive learning environments for both genders (Gil-Arias et al., 2021), offering more significant participation opportunities and fostering participants' physical literacy (Cairney et al., 2019).

In the specific context of volleyball, hybrid approaches improve technical performance in skills such as serving, passing, and setting (Batez et al., 2021), as well as physical performance (Stojanović et al., 2023), engagement, motivation, and enjoyment (Batez et al., 2021; García-González et al., 2020; Gil-Arias et al., 2017). Beyond tactical-technical aspects, school-based approaches should emphasize human development, recognizing students as assets to be nurtured (Bowers et al., 2021; Malete et al., 2022).

The literature shows that TGfU has been hybridized with various teaching models, such as Sports Education (Gil-Arias et al., 2020, 2021; Tendinha et al., 2021), enabling students to learn through and for sports. Additionally, other models articulate with TGfU to foster holistic student development (Shen & Shao, 2022; Stolz & Pill, 2014). This aligns with Brazil's national curriculum framework (*Base Nacional Comum Curricular* - BNCC), which emphasizes the importance of experiential learning in schools to foster ethical, conscious, and reflective decision-making in defense of human rights and democratic values (Brasil, 2018).

According to the BNCC, in addition to fostering self-awareness and self-care regarding body and health, socialization and entertainment in the school environment promote interdisciplinary dialogue and broaden students' understanding of the social dynamics and phenomena associated with physical practices (Brasil, 2018). Consequently, promoting social-emotional competencies, including self-awareness, self-management, social awareness, relationship skills, and responsible decision-making, is essential for fostering empathetic and cooperative citizens while strengthening students' mental well-being (Frimaio et al., 2024).

Although distinct approaches, Positive Youth Development (PYD) shares common ground with TGfU by reducing risky behaviors such as delinquency, substance abuse, violence, and school dropout while reinforcing youths' virtues and strengths (Esperança et al., 2013). Effective PYD requires sustained positive relationships between youth and adults, activities that develop life skills, and opportunities for youth to apply these skills as participants or leaders in community activities (Lerner et al., 2005, 2011).

In this context, transferring life skills learned through sports to everyday life hinges on intentional teaching and deliberate pedagogical strategies to maximize youth development outcomes

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(Bean et al., 2018; Malete et al., 2022; Zhou et al., 2020). Two distinct teaching approaches are evident: an implicit approach, where life skills development occurs without explicit discussion of their transferability (Malete et al., 2022), and an explicit approach, where specific pedagogical strategies are employed to facilitate the transfer of these skills, with open discussion during lessons (Bean et al., 2022; Turnnidge et al., 2014). Simply teaching sports is insufficient to guarantee the transfer of life skills; instead, explicit instruction in life skills transfer is fundamental to the educational process in school sports (Jacobs & Wright, 2018; Zheng et al., 2023).

Although research on TGfU in school settings (Alcalá & Garijo, 2017; Barba-Martín et al., 2020; Ortiz et al., 2023) and life skills through sports education (Coppola et al., 2024; Esperança et al., 2013; Holt et al., 2020) is extensive, little is known about the impact of combining these approaches in Physical Education. This combination is grounded in the need to rethink students' holistic development, as TGfU leverages constructivist principles (Butler, 2006; Fagundes & Ribas, 2019; Kirk & Macdonald, 1998). At the same time, life skills focus on positive youth development by emphasizing their strengths and virtues (Camiré & Santos, 2019). These complementary approaches align with the BNCC, Brazil's guiding document for primary education (Brasil, 2018).

Based on the potential of these teaching approaches and the existing knowledge gap regarding their combined use compared to traditional teaching methods, this study aimed to compare tactical-technical learning and students' self-perceptions of life skills between TGfU and direct instruction models. The following hypotheses were formulated: a) the TGfU group will demonstrate tactical-technical performance comparable to the direct instruction group; b) the TGfU group will score higher in life skills than the direct instruction group.

2. Materials and Methods

2.1. Sample

The sample consisted of 67 students from a public municipal school in Goiânia, comprising both sexes, aged between 13 and 15 years, all enrolled in the ninth grade of elementary school. To determine the sample size, an a priori power analysis was performed using G*Power software (v. 3.1.9.7). The study by Dalamitros et al. (2023) served as a reference, estimating a sample size sufficient to achieve 95% power to detect a medium effect size (d = 0.30) with a significance criterion of $\alpha = 0.05$. This calculation indicated a minimum sample size of 27 participants. However, to align the data collection with the school's pedagogical structure, it was decided to organize each group as a specific class, resulting in one class of 23 students for the TGfU group and two classes of 22 students each for the traditional instruction and control groups.

Inclusion criteria required participants to be enrolled in the school and willing to participate voluntarily. Exclusion criteria included any injury preventing effective participation in classes or tests, absence on scheduled testing days, or missing more than 25% of the lessons. The ethics committee approved the study (approval code: CAAE 65290217.2.0000.5083).

2.2. Experimental Design

Participants were divided into three groups, witch TGfU Group – Volleyball was taught using the TGfU model, incorporating explicit instruction of life skills; Traditional Group – Volleyball was taught using direct instruction, with life skills taught implicitly; Control Group – A different sport was taught, with life skills also taught implicitly.

Pre-tests were conducted over two consecutive days to assess potential differences in technical-tactical learning and life skills acquisition. Following an 18-lesson unit, with each lesson lasting 60 minutes, post-tests were administered similarly.

Each student was analyzed over three sets of 15 points. For consistency, the post-test retained the pre-test team compositions and matchups. The matches were recorded from above the court using two cameras positioned approximately 4 meters behind each end line, elevated 4 meters off the ground. A GoPro Hero 8 Black (GoPro, Inc., Finland) recorded in HD 1080p at 60Hz. To ensure intra-

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and inter-observer reliability, 20% of the sample was reanalyzed, yielding Kappa values above 0.82, exceeding the recommended threshold.

2.3. Tactical-Technical Performance

Tactical-technical performance was evaluated using the Game Performance Assessment Instrument (GPAI), validated by Collet et al. (2011) as the Instrument for Assessing Tactical-Technical Performance in Volleyball (IAD-Vb). The evaluation included two specific indicators: 1 - Specific Performance by Action (SPA), which assessed the serve, reception, set, attack, and defense; 2- Specific Performance by Component (SPC), which evaluated adjustment, efficiency, decision-making, and effectiveness.

Adjustment refers to the preparation phases for executing actions; efficiency assesses technical execution; decision-making evaluates strategic options; and effectiveness measures outcomes of fundamental skills. During the assessment, students were divided into 6-player teams and played 6x6 volleyball matches. Adaptations included two serves per team regardless of scoring, rotation after each team's serves, and sets capped at 15 points.

2.4. Life Skills

The Life Skills Scale for Sport (P-LSSS) (Nascimento-Junior et al., 2020) assessed students' perceptions of learning life skills. The scale evaluates eight core life skills associated with sports participation: teamwork, goal setting, social skills, problem-solving and decision-making, emotional skills, leadership, time management, and interpersonal communication skills (Johnston et al., 2013). The P-LSSS showed a high intraclass correlation coefficient for its validation (Nascimento-Junior et al., 2020), making it suitable for this study's objectives.

2.5. Statistical Procedures

Descriptive data were presented as means and standard deviations. The Friedman test was employed as tactical-technical response data did not meet normality assumptions. A two-way repeated-measures ANOVA was used for students' self-perceptions of life skills and success perception variables, which displayed normal distribution, considering group (intervention types) and time (pre- and post-tests) as factors, with Bonferroni post-hoc adjustments where necessary. Effect sizes were calculated as follows: partial eta squared (η^2_p) for ANOVA (0.01 = small, 0.06 = medium, 0.14 = large), and Kendall's W for the Friedman test (0.1–<0.3 = small, 0.3–<0.5 = moderate). All analyses were conducted using SPSS (Version 25.0 for Windows, SPSS Inc., Chicago, IL, USA), with a significance level of $p \leq 0.05$.

3. Results

3.1. Tactical-Technical Performance

Comparisons of specific performance by action using the Friedman test revealed no significant differences between groups for serve [χ^2 (5)=7,434; p=0,190; W=0,078], reception [χ^2 (5)=12,725; p=0,26; W=0,196], setting [χ^2 (5) = 4,333; p=0,502; W=0,433], attack [χ^2 (5)=6,538; p=0,257; W=0,654], and defense [χ^2 (5)=5,00; p=0,416; W=0,654] (Table 1).

Table 1. Results of Mean Scores for Pre- and Post-Test Specific Performance by Action (SPA).

	TGFU GROUP		TRADITIONAL GROUP		CONTROL GROUP	
	Pre	**Post**	**Pre**	**Post**	**Pre**	**Post**
Serve	25.73 (± 2.47) 6.70(±5.97)		30.35 (±2.39) (±1.49)	34.34	33.95 (±1.73) (±2.02)	32.24
Reception	16.82 (±4.04) (±3.57)	21.33	8.59 (±3.14) (±2.26)	18.26	22.77 (±3.82) (±1.98)	20.59

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Setting	2.08 (±2.08) (±0)	12.50	3.75 (±2.50) (±2.42)	13.75	15.47 (±4.33)	5.35 (±2.52)
Attack	12.50 (±5.70) (±2.60)	8.23	0 (±0) (±3.31)	12.55	17.04 (±4.22) (±2.18)	15.86
Defense	16.25 (±7.80) (±3.97)	15.00	0 (±0) (±6.87)	19.37	28.12 (±7.74) (±2.68)	27.34

Specific performance by component analysis using the Friedman test revealed no significant differences between groups in adjustment [χ^2 (5)=4.240; p= 0.515; W=0.039], efficiency [χ^2 (5)=7.256; p=0.202; W=0.066], and effectiveness [χ^2 (5)=7.243; p=0.203; W=0.092]. However, when considering decision-making, the Friedman test indicated significant differences between groups [χ^2 (5)=30.717; p=0.001; W=0.279]. Pairwise comparison tests showed that the control group achieved a higher mean score in the pre-test compared to the TGfU/Life Skills group (p=0.038), and the traditional group achieved a higher mean score in the post-test compared to the pre-test (p=0.033) (Table 2).

Table 2. Results of Mean Scores for Pre- and Post-Test Specific Performance by Component (SPC).

	TGFU GROUP		**TRADITIONAL GROUP**		**CONTROL GROUP**	
	Pre	**Post**	**Pre**	**Post**	**Pre**	**Post**
Adjustment	0.15 (±0.15) (±0.45)	0.64	3.38 (±2.10) (±0.46)	0.58	0.37 (±0.37)	0 (±0)
Efficiency	64.70 (± 4.37) (±5.32)	64.28	62.36 (±5.29) (±4.54)	60.81	67.03 (±4.54) (±4.34)	54.39
Decision-Making*[a]	0.15 (±0.15) (±1.23)	3.11	0.75 (±0.52) (±1.53)	6.46	5.55 (±1.26)	5.46 (1.30)
Effectiveness	24.08 (±4.25) (±3.62)	30.80	31.64 (±4.62) (±4.25)	38.57	39.99 (±3.66) (±4.46)	36.66

* Difference between pre-test and post-test scores for the Control group. [a] Difference between the pre-test scores of the TGfU/Life Skills group and the Traditional group.

3.2. Life Skills

The repeated-measures ANOVA revealed a significant difference in teamwork scores for the group factor [(F (2,34) = 4.862; p= 0.014; η^2_p= 0.019] but not for the time factor [F (1,21) = 1.583; p= 0.222; η^2_p=0.070], and the interaction between group and time [(F (2,42) = 0.614; p= 0.546; η^2_p = 0.28]. The Bonferroni post-hoc analysis showed that the TGfU/Life Skills group had significantly higher scores than the Traditional group (p=0.008). For goal-setting, the repeated-measures ANOVA revealed a significant difference in the group factor [(F (2,42)=13.170; p=0.001; η^2_p = 0.385] but no significant differences for the time factor [F(1,21)=1.556; p=0.226; η^2_p = 0.068], and the interaction between group and time [(F(2,42)=1.838; p=0.172; η^2_p = 0.080]. Bonferroni post-hoc analysis indicated that the Traditional group scored higher than the TGfU/Life Skills group (p=0.001), and the Control group scored higher than the TGfU/Life Skills group (p=0.001). For other life skills, no significant differences were observed across groups: social skills – group factor [(F(2,42)=0.130; p=0.878; η^2_p = 0.006], time factor [(F(1,21)=0.349; p=0.561; η^2_p = 0.016], and interaction between group and time [(F(2,42)=2.192; p=0.124; ηp2=0.095]; problem solving - group factor [(F(2,42)=0.946; p=0.493; η^2_p =0.043], time factor [(F(1,21)=0.486; p=0.493; η^2_p = 0.023] , and interaction between group and time [(F(2,42)=2.581; p=0.088; η^2_p = 0.109]; emotional skills - group factor [(F(2,42)=0.164; p=0.850; η^2_p = 0.008], time factor [(F(1,21)=1.064; p=0.314; η^2_p = 0.048], and interaction between group and time [(F(2,42)=0.893; p=0.417; η^2_p = 0.041]; leadership - group factor [(F(2,42)=0.114; p=0.893; ηp2=0.005], time factor [(F(1,21)=0.884; p= 0.358; η^2_p = 0.040], and interaction between group and time [(F(2,42)=1.919; p=0.159; ηp2=0.084]; time management - group factor [(F(2,42)=0.332; p=0.719; η^2_p = 0.016], time factor [(F(1,21)=0.159; p=0.694; ηp2=0.008], and interaction between group and time [(F(2,42)=2.135; p=0.131; η^2_p = 0.092];

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communication - group factor [(F(2,42)=0.348; p=0.708; η^2_p = 0.016], time factor [(F (1,21)=0.002; p=0.964; η^2_p=0.0001], and interaction between group and time [(F(2,42)=1.418; p=0.254; η^2_p=0.063] (Table3).

Table 3. Results of Mean Scores for Pre- and Post-Test Life Skills.

	TGFU GROUP		TRADITIONAL GROUP		CONTROL GROUP	
	Pre	**Post**	**Pre**	**Post**	**Pre**	**Post**
Teamwork*	3,45 (±0.95) (±1,15)	3.80	3.50 (±1.11) (±0.93)	3.62	3.79 (±1.09) (±0.93)	3.79
Goal Setting[ab]	2.57 (±0.69) (±0.83)	2.74	3.75 (±1.16) (±1.00)	3.57	4.01 (±1.06) (±0.93)	3.59
Social Skills	3.44 (±0.90) (±1.18)	3.75	3.59 (±1.08) (±1.03)	3.35	3.61 (±1.31) (±0,96)	3.32
Problem Solving	3.29 (±0.92) (±0.88)	3.87	3.33 (±1.11) (±0.78)	3.22	3.37 (±1.26) (±1.08)	3.21
Emotional Skills	3.23 (±0.91) (±1.08)	3.68	3.30 (±1.22) (±0.70)	3.34	3.42 (±1.19) (±0.87)	3.39
Leadership	3.17 (±0.82) (±1.01)	3.61	3.40 (±1.05) (±0.76)	3.20	3.32 (±1.12) (±0.85)	3.48
Time Management	3.18 (±0.86) (±1,27)	3.53	3.30 (±1.11) (±0.90)	3.00	3.45 (±1.15) (±1.11)	3.21
Communication	3.36 (±1,05) (±1.15)	3.67	3.37 (1.12) (±0.93)	3.23	3.59 (±1.18) (±0.87)	3.39

* Significant difference between the TGfU/Life Skills group and the Traditional group in pre-test. [a] Significant difference between TGfU/Life Skills group and Traditional group in pre-test. [b] Significant difference between TGfU/Life Skills group and Control group in pre-test.

4. Discussion

Contemporary theories, which originated from the TGfU model, shifted the focus of sports education to the students themselves, with technical learning subordinated to tactical learning (Bunker & Thorpe, 1986; Kirk & MacPhail, 2002; Pereira et al., 2013). Within this new framework, TGfU has proven to be an effective method for both tactical and technical learning, engaging students in a more motivating manner (Alcalá & Garijo, 2017; Barba-Martín et al., 2020; Gil-Arias et al., 2017). At the same time, sports began to be perceived as a tool for social transformation, offering education beyond sport itself and facilitating the acquisition of life skills (Camiré et al., 2023; Nascimento Junior et al., 2022). Therefore, this study aimed to compare tactical-technical learning and students' self-perceptions of life skills between the TGfU model and the direct instruction model for ninth-grade students at a public school.

Our first hypothesis that the TGfU/Life Skills group would perform similarly in terms of tactical-technical skills compared to the direct instruction group was confirmed. The analysis of technical components such as efficiency and effectiveness showed no significant difference between the TGfU/Life Skills and direct instruction groups. These findings support the study by Batez et al. (2021) revealing similar technical performance between the TGfU/Life Skills and direct instruction groups after a 12-session intervention with 54 students aged 14 to 16. Another study, Pereira et al. (2013) with students aged 11 to 13 years, observed similar improvements in technical skills from pre-test to post-test in both the constructivist model and the direct instruction group after 20 lessons. On the other hand, a study comparing technical learning in hockey over 15 teaching sessions found that the traditional teaching group exhibited greater technical learning than the TGfU group (Turner & Martinek, 1999). Regarding tactical learning, the study conducted with 88 students aged 11 to 12 years showed that after 15 sessions of 45 minutes, students exposed to constructivist interventions

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demonstrated superior game performance and tactical skills compared to the direct instruction group (Rocamora et al., 2019). Similarly, a study with 40 students aged 11 to 12 found that students exposed to tactical game approaches improved decision-making and technical execution compared to the direct instruction group (González-Espinosa et al., 2021). These findings suggest that tactical-technical learning warrants further research, although TGfU appears to offer more benefits than direct instruction (Aburachid et al., 2019; González-Espinosa et al., 2021; Ortiz et al., 2023). Furthermore, it seems that decision-making and motor skills in more complex environments, such as actual game situations, require additional time to observe differences in learning (Nathan, 2016).

Our second hypothesis, that the TGfU/Life Skills group would score higher in life skills compared to the direct instruction group, was refuted. These results contradict the findings of those Zetou et al. (2022) who examined the effect of a life skills program on 44 children aged 9 to 11 years and found that the program based on explicit life skills teaching was more effective, finding that students understood the concept and function of life skills and intended to use them in other areas. In another study, after an 8-month intervention with 61 young people aged 10 to 15 years, a basketball teaching program focused on the explicit development of life skills contributed to the transfer of life skills as perceived by participants (Ciampolini et al., 2020). This included implicit strategies (creating a mutual trust environment and positive coach behaviors) and explicit strategies (discussing life skills during practice and how to apply them in other contexts). Compared to the literature, the observed differences may be explained by the fact that younger students learn life skills more easily through implicit methods than older students due to cognitive maturity (Bean et al., 2022). Consequently, the implicit development group likely did not differ from the explicit development group, as the students were young and had lower cognitive maturity.

When comparing constructivist and direct instruction models, sports teaching shows similarities in tactical-technical performance. This is likely due to integrating tactical and technical skills during instruction and tasks tailored to the student's motor and cognitive performance (Araújo et al., 2019; Batez et al., 2021; Pereira et al., 2013; Trajković & Kri, 2017). Beyond performance aspects, sports possess characteristics that influence daily life, and when it comes to life skills (Lerner et al., 2005), it is evident that sports also contribute to the development of life skills in a non-intentional manner (Holt, 2016). However, participating in a sports program does not guarantee positive outcomes (Coakley, 2016).

5. Conclusions

Given the findings, a practical application of this study suggests that sports education should explicitly focus on human development, specifying which aspects of human development will be addressed in each lesson plan. Therefore, schools should update their pedagogical political projects to outline how this should be implemented in teaching practice. Furthermore, it is suggested that the Brazilian federal government train school administrators and teachers in implementing pedagogical tools for comprehensive human development. This is especially important since sports practice is a means for developing more than just the tactics and techniques inherent in sports and the teaching model. However, an intervening factor may not be sufficient to alter students' perceptions of education. Nevertheless, this research, like any other, is not without limitations. In this case, it should be considered that the students had been without in-person physical education classes for two years, which may have resulted in losing motor skills, potentially influencing the outcomes.

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Informed Consent Statement: Informed consent was obtained from all subjects involved in the study. The students and parents have obtained written informed consent to publish this paper.

Data Availability Statement: All data supporting the reported results are described in this manuscript. Due to privacy restrictions, raw data may be requested from the corresponding author upon institutional request.

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Abbreviations

The following abbreviations are used in this manuscript:

TGfU	Teaching Games for Understanding
BNCC	*Base Nacional Comum Curricular*
PYD	Positive Youth Development
GPAI	Game Performance Assessment Instrument
P-LSSS	Life Skills Scale for Sport

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