

Learning styles of college students in physical education: insights from Kolb's experiential learning theory

Ahmed Ghorbel^{1,2ABD}, Mohamed Moncef Kammoun^{3AC}, Mohamed Yaakoubi^{1,2BD}, Omar Trabelsi^{1,2BD}, Liwa Masmoudi^{1,3AC}, Adnene Gharbi^{1,3AE}

¹ Research Unit: Physical Activity, Sport and Health, UR18JS01, National Observatory of Sport, Tunisia

²The High Institute of Sport and Physical Education, University of Jendouba, Tunisia

³The High Institute of Sport and Physical Education, University of Sfax, Tunisia

Authors' Contribution: A – Study design; B – Data collection; C – Statistical analysis; D – Manuscript Preparation; E – Funds Collection

Abstract

Background and Study Aim Understanding learning style preferences in physical education (PE) is essential for optimizing teaching strategies and improving student outcomes. The research aims to provide insights into how tailored pedagogical approaches can enhance learning effectiveness in PE programs.

Material and Methods A cross-sectional study was conducted with college students enrolled in physical education courses. Kolb's LSI was administered to categorize learning styles into four types: accommodating (intuitive-pragmatic), diverging, assimilating, and converging. Data were analyzed to determine the distribution of learning styles and their correlations with gender, type of high school diploma (sports-related vs. non-sports-related), and sport category (individual or team-based). Statistical analyses were performed using the Mann-Whitney U test to analyze differences across dimensions based on gender, high school diploma, and categories of sports.

Results The findings indicated a dominant preference for the accommodating learning style (active experimentation and concrete experience). This aligns with the hands-on, dynamic nature of PE. Differences were observed based on sport specialization. Students in individual sports exhibited greater tendencies toward introspection and analytical thinking (assimilating style). In contrast, those in team sports leaned toward active experimentation. Additionally, students from non-sports-related high school backgrounds showed a stronger preference for active experimentation compared to their peers with sports-focused diplomas. No significant gender-based differences were found in learning style preferences.

Conclusions The study highlights the need for diverse and adaptive teaching methods in physical education to cater to varied learning styles. Emphasizing experiential learning, particularly for students from non-sports academic backgrounds, and incorporating reflective practices for individual-sport athletes could enhance engagement and performance. These insights can help educators design more effective PE curricula. Ultimately, this supports students' academic and professional development in sports-related fields.

Keywords: learning style preference, categories of sports, high school diploma, Kolb's learning theory, individual and team sports

Introduction

In an era where personalized learning is revolutionizing education, understanding how students engage with physical and sports education remains a critical yet underexplored frontier, particularly in culturally distinct contexts like Tunisia, where traditional pedagogical approaches may clash with modern learning diversity [1, 2]. The comprehension of learning styles in physical education and sports science represents a critical scientific challenge for optimizing pedagogical practices. Grounded in Kolb and Boyatzis's [3] experiential learning theory and its contemporary developments [4], this issue is particularly complex

in physical education and sports science, where theoretical and practical demands intersect [5].

Learning styles, defined as individual preferences in acquiring, processing, and retaining information [6, 7], play a fundamental role in shaping educational outcomes. Kolb and Boyatzis's [3] model identifies four learning modes: concrete experience, reflective observation, abstract conceptualization, and active experimentation, categorizing learners into four primary styles: divergent, assimilative, convergent, and accommodative. Kolb and Boyatzis's [3] experiential learning theory provides a relevant conceptual framework for analyzing these dynamics. This model outlines four learning modes: concrete experience, reflective observation, abstract conceptualization, and active experimentation, categorizing learners into four primary styles: divergent, assimilative, convergent, and accommodative.

Divergent learners demonstrate exceptional ability in generating ideas and examining situations from multiple perspectives. In sports education, they particularly benefit from brainstorming sessions and group discussions, where they can explore various strategies and techniques [8, 9]. Assimilative learners prefer logical approaches and excel at organizing information systematically. They thrive in environments involving theoretical analysis and model creation, making them particularly suited for developing sports strategies and game analysis [4]. Convergent learners stand out in practical problem-solving, preferring to implement ideas in real-world applications. Accommodative learners (also called adapters) learn most effectively through hands-on experience and are comfortable taking risks. They benefit greatly from direct participation in activities, such as experimenting with new games or techniques in practical settings [10].

The Tunisian education system relies on a structured orientation process that directs students toward specific fields or “branches” based on their abilities, academic performance, and preferences. In the context of STAPS (Sciences and Techniques of Physical and Sports Activities) students, there is a notable diversity in academic backgrounds and educational paths. At the Higher Institute of Sport and Physical Education (ISSEP), students come from various disciplines, bringing a wide range of experiences, skills, and professional aspirations. This diversity is both an asset and a challenge for educators, who must adapt their teaching strategies to address the specific needs of each group and effectively support their academic and practical training.

The study of learning styles in sports science and physical education reveals a complex and often contradictory landscape, marked by significant heterogeneity across research findings. Some research highlights the prevalence of the convergent style, which aligns with solving motor problems and applying techniques in real-time sports situations [11]. In contrast, other studies identify a dominance of the accommodative style, emphasizing active experimentation and hands-on learning [12]. Additionally, while some scholars report a preference for an assimilative style in physical education [13], others find that active learning is more common among physical education students [12], whereas the reflective style is less favored [14]. Furthermore, certain studies suggest that the divergent style is predominant among physical education students [8, 9]. These discrepancies suggest the likely influence of contextual and cultural factors in shaping preferred learning styles.

Additionally, gender differences in learning styles remain a contested area. West [15] found that male students tend to prefer analytical, assimilative approaches, while female students favor divergent

styles. However, contradictory patterns emerge in other contexts. Holland and Mills [16] observed male sport therapy students preferring abstract learning compared to females’ concrete orientation, whereas Steffen and Meany [17] reported female soccer coaches adopting more convergent (practical problem-solving) approaches than their male counterparts, who used divergent styles. [18] noted that women outside of athletics tend to prefer visual and reflective learning styles, while men lean toward reading/writing and reflective learning styles, indicating a gender divergence in learning preferences.

Beyond initial education, in technical and scientific fields such as electromechanics and physics, the convergent learning style predominates [12, 19]. Conversely, in humanities subjects like history, students tend to adopt a divergent learning style, emphasizing creativity and the ability to examine topics from multiple perspectives [20]. Despite the strategic importance of physical education and the extensive literature on learning styles, research specifically examining these styles within the context of students in STAPS remains limited. In particular, no studies have focused on the relationship between the choice of academic sections and learning styles in STAPS. Additionally, while some studies have explored the links between learning styles, gender, type of sport practiced, and academic success, they often overlook the integration of more complex and nuanced models, such as Kolb’s model, which could provide a deeper understanding of students’ learning preferences in this specific domain. This study aims to address these gaps by adopting a targeted approach to analyze the preferred learning styles of STAPS students through Kolb’s model. Additionally, the study integrates underexplored variables, including gender differences, the type of high school diploma obtained, and sport speciality.

By employing this comprehensive framework, our research sheds light on the unique academic and athletic profiles of STAPS students, providing innovative insights for optimizing pedagogical strategies in this discipline. Ultimately, this work contributes to advancing the understanding of learning styles within a distinctive educational and athletic context, where the synergy between theoretical knowledge and practical application is fundamental.

This study aims to address this gap through a rigorous methodological approach, combining the Learning Style Inventory with multivariate analyses. The objectives are fourfold:

- 1) to map predominant learning styles among Tunisian physical education and sport science students;
- 2) to analyze differences between these styles and key variables (gender, sports specialization,

academic background);
3) to assess the impact of practice level (recreational vs. competitive) on learning profiles;
4) to propose evidence-based pedagogical recommendations validated through a pilot intervention.

Materials and Methods

Participants

This cross-sectional study analyzed a cohort of 180 second-year undergraduate students (male = 88, female = 92; age = 20.42 ± 0.76 years) enrolled at the Higher Institute of Sport and Physical Education (ISSEP) in Sfax, Tunisia. The sample was purposively selected during the critical academic transition phase, when students declare their sport specialization (team sports: $n = 101$; individual sports: $n = 79$). Participants represented two distinct academic backgrounds: sport-specific high school graduates ($n = 124$) and non-sport diploma holders ($n = 56$). Data collection followed strict inclusion criteria, with only fully completed questionnaires considered for analysis. The selection of second-year students was methodologically justified by their unique position in the ISSEP curriculum, where specialization choices directly influence subsequent professional training trajectories.

Research Design

The study assessed students' learning styles using a questionnaire divided into two sections: sociodemographic data (including high school diploma type, sports participation, and gender) and the Arabic version of Kolb's Learning Style Inventory (LSI), which had been previously validated [21, 22, 23]. The LSI consisted of 12 items rated on a 4-point scale, measuring four learning modalities: Concrete Experience (CE), Abstract Conceptualization (AC), Reflective Observation (RO), and Active Experimentation (AE), with composite scores (AC - CE and AE - RO) calculated to classify participants into one of four dominant learning styles (assimilating, converging, diverging, or accommodating) based on Kolb's normative cutoffs [24]. A pilot test ($n = 10$) confirmed item comprehension, and internal consistency was acceptable ($\alpha = 0.76$ for AC - CE; $\alpha = 0.72$ for AE - RO).

Statistical Analysis

Data were analyzed using Excel and SPSS, with non-parametric tests (Mann-Whitney U) and rank-biserial correlations (r) employed to compare groups. Effect sizes were interpreted as small (0.10), medium (0.30), or large (0.50) [25].

Results

Learning style preference

The results of our study revealed that the

majority of students in our institution exhibit an intuitive-pragmatic (accommodating) learning style, accounting for 45.6% of cases ($N = 82$; $M \pm SD = 2.46 \pm 1.06$; Med = 3; IQR = 2). The results are presented in Table 1. Following this, an intuitive-reflective (divergent) learning style was identified in 27.8% of students, a methodical-reflective (assimilating) style in 12.8%, and a methodical-pragmatic (converging) style in 13.9% of students.

Gender Differences

Descriptive statistics (Table 1) show that the majority of female students prefer the intuitive-pragmatic (accommodating) learning style, representing 46.7% of cases ($N = 92$; $M \pm SD = 2.39 \pm 1.06$; Med = 3; IQR = 2). Following this, 31.5% ($N = 29$) prefer the intuitive-reflective (divergent) style, 9.8% ($N = 14$) opt for the methodical-reflective (assimilating) style, and 12% ($N = 11$) favor the methodical-pragmatic (converging) style.

Male students also tend to prefer the intuitive-pragmatic (accommodating) style, chosen by 44.3% ($N = 39$) ($N = 88$; $M \pm SD = 2.52 \pm 1.03$; Med = 3; IQR = 1). Additionally, 23.9% ($N = 21$) prefer the intuitive-reflective (divergent) style, 15.9% ($N = 14$) choose the methodical-reflective (assimilating) style, and another 15.9% ($N = 14$) opt for the methodical-pragmatic (converging) style.

No statistically significant differences were observed between gender and the other learning dimensions ($p > 0.05$ for all comparisons). This indicates that gender does not have a significant influence on AE, RO, AC, or CE (Table 2).

Descriptive statistics (Table 1) show that the majority of female students prefer the intuitive-pragmatic (accommodating) learning style, representing 46.7% of cases ($N = 92$; $M \pm SD = 2.39 \pm 1.06$; Med = 3; IQR = 2). Following this, 31.5% ($N = 29$) prefer the intuitive-reflective (divergent) style, 9.8% ($N = 14$) opt for the methodical-reflective (assimilating) style, and 12% ($N = 11$) favor the methodical-pragmatic (converging) style.

Male students also tend to prefer the intuitive-pragmatic (accommodating) style, chosen by 44.3% ($N = 39$) ($N = 88$; $M \pm SD = 2.52 \pm 1.03$; Med = 3; IQR = 1). Additionally, 23.9% ($N = 21$) prefer the intuitive-reflective (divergent) style, 15.9% ($N = 14$) choose the methodical-reflective (assimilating) style, and another 15.9% ($N = 14$) opt for the methodical-pragmatic (converging) style.

No statistically significant differences were observed between gender and the other learning dimensions ($p > 0.05$ for all comparisons). This indicates that gender does not have a significant influence on AE, RO, AC, or CE (Table 2).

Learning style preference

The results of our study revealed that the majority of students in our institution exhibit an intuitive-pragmatic (accommodating) learning

Table 1. Descriptive Statistics

Independent variables	f (%)				Mean	SD	Med	IQR	
	Learning style								
	1	2	3	4					
Sample	50 (27.8)	23 (12.8)	82 (45.6)	25 (13.9)	2.46	1.04	3	2	
Gender	Girls (N = 92)	29 (31.5)	9 (9.8)	43 (46.7)	11 (12)	2.39	1.06	3	2
	Boys (N = 88)	21 (23.9)	14 (15.9)	39 (44.3)	14 (15.9)	2.52	1.03	3	1
High school diploma	sport-specific diplomas (N = 124)	34 (27.4)	13 (10.5)	63 (50.8)	14 (11.3)	2.46	1.02	3	2
	non-sport-specific diplomas (N = 56)	16 (28.6)	10 (17.9)	19 (33.9)	11 (19.6)	2.54	1.11	3	2
Sports Specialization	Team Sports (N = 101)	23 (22.8)	11 (10.9)	56 (55.5)	11 (11.3)	2.54	0.97	3	1
	Individual Sports (N = 79)	27 (34.2)	12 (15.2)	26 (32.9)	14 (17.7)	2.34	1.13	3	2

Note. *f* = frequency; % = percentage; *M* = mean; *SD* = standard deviation; *Med* = median; *IQR* = interquartile range; 1 = intuitive-reflective (divergent); 2 = methodical-reflective (assimilating); 3 = intuitive-pragmatic (accommodating); 4 = methodical-pragmatic (converging).

Table 2. Comparison of Mean Scores (\pm SE) Between Boys and Girls

Variables	Girls (M \pm SE)	Boys (M \pm SE)	p
Active Experimentation	31.43 \pm 4.73	31.92 \pm 4.53	0.589
Reflective Observation	29.10 \pm 4.96	28.45 \pm 4.87	0.797
Abstract Conceptualization	31.20 \pm 3.74	31.05 \pm 3.75	0.233
Concrete Experience	27.65 \pm 4.03	28.12 \pm 4.76	0.931

style, accounting for 45.6% of cases (N = 82; M \pm SD = 2.46 \pm 1.06; Med = 3; IQR = 2). The results are presented in Table 2. Following this, an intuitive-reflective (divergent) learning style was identified in 27.8% of students, a methodical-reflective (assimilating) style in 12.8%, and a methodical-pragmatic (converging) style in 13.9% of students.

High school diploma

Descriptive statistics (Table 1) show that the majority of students with sport-specific diplomas prefer the intuitive-pragmatic (accommodating) learning style, representing 50.8% of cases (N = 63; M \pm SD = 2.46 \pm 1.02; Med = 3; IQR = 2). Following this, 27.4% (N = 34) prefer the intuitive-reflective (divergent) style, 10.5% (N = 13) opt for the methodical-reflective (assimilating) style, and 11.3% (N = 14) favor the methodical-pragmatic (converging) style.

Students from other academic backgrounds also tend to prefer the intuitive-pragmatic (accommodating) style, chosen by 33.9% (N = 19)

(N = 56; M \pm SD = 2.54 \pm 1.11; Med = 3; IQR = 2). Additionally, 28.6% (N = 16) prefer the intuitive-reflective (divergent) style, 17.9% (N = 10) choose the methodical-reflective (assimilating) style, and another 19.6% (N = 11) opt for the methodical-pragmatic (converging) style.

The Mann–Whitney U test revealed a statistically significant difference in the dimension of Active Experimentation between participants with sport-specific diplomas and those with non-sport-specific diplomas (p < 0.05). Specifically, participants with non-sport-specific diplomas scored higher on this dimension. The analysis revealed a small effect size (r = 0.17), indicating a modest but statistically significant difference in this dimension.

No significant differences were observed in the dimensions of Reflective Observation, Abstract Conceptualization, or Concrete Experience between the two groups. The results are summarized in Figure 1, which presents the mean scores (\pm SE) for each dimension across the two groups.

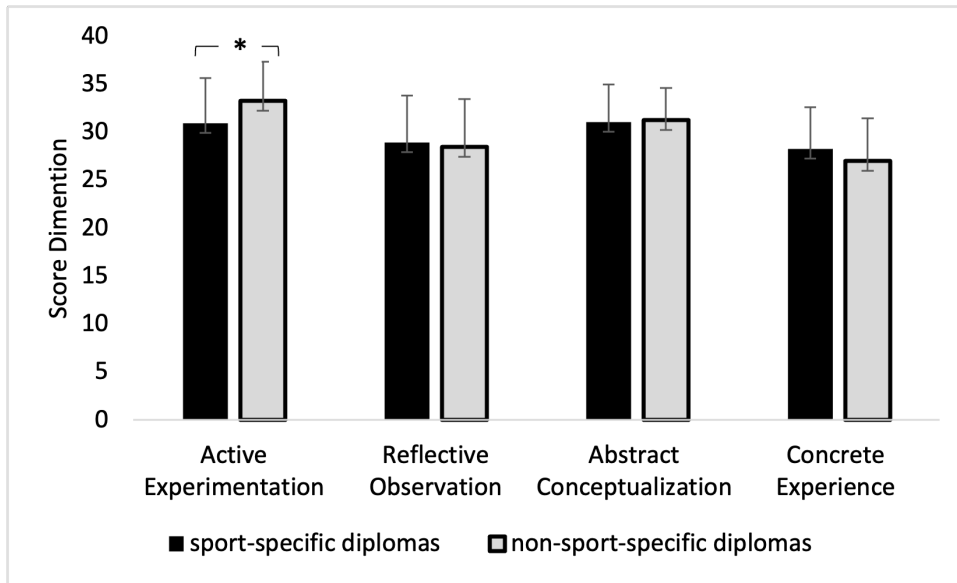
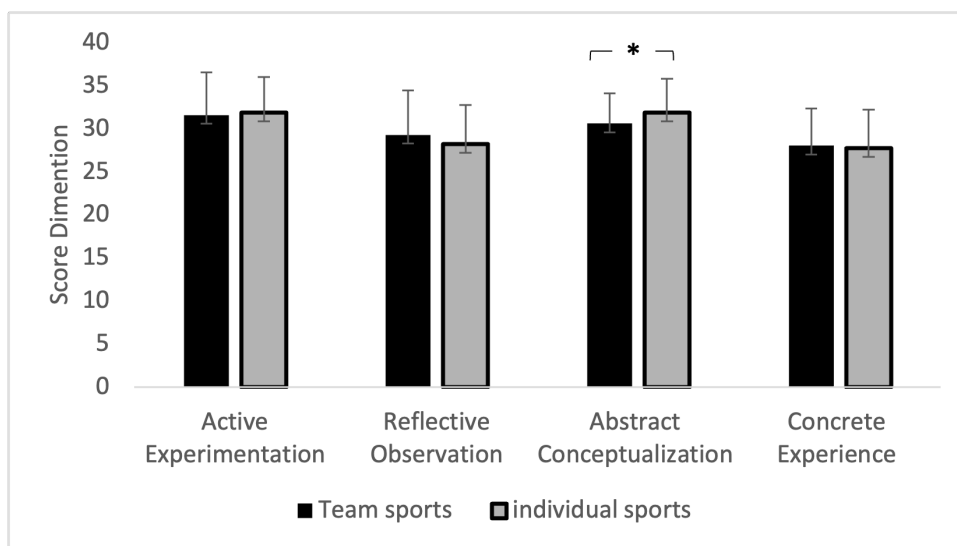


Figure 1. Comparison of mean score dimensions (\pm SE) between sport-specific and non-sport-specific diploma holders. * Statistically significant at $p < 0.05$.



*, significantly different at $p < 0.05$

Figure 2: Comparison of mean Score Dimension (\pm SE) between team sport and the individual sport

Sport speciality

Descriptive statistics (Table 1) show that the majority of students specializing in team sports prefer the intuitive-pragmatic (accommodating) learning style, representing 55.5% of cases ($N = 101$; $M \pm SD = 2.54 \pm 0.97$; Med = 3; IQR = 1). Following this, 22.8% ($N = 23$) prefer the intuitive-reflective (divergent) style, 10.9% ($N = 11$) opt for the methodical-reflective (assimilating) style, and 11.3% ($N = 11$) favor the methodical-pragmatic (converging) style.

Students in individual sports also tend to prefer the intuitive-reflective (divergent) style, chosen by 34.2% ($N = 27$) ($N = 79$; $M \pm SD = 2.34 \pm 1.13$; Med = 3; IQR = 2). Additionally, 32.9% ($N = 26$) prefer the intuitive-pragmatic (accommodating) style,

15.2% ($N = 12$) choose the methodical-reflective (assimilating) style, and another 17.4% ($N = 14$) opt for the methodical-pragmatic (converging) style.

The Mann-Whitney U test indicated a statistically significant difference in the dimension of Abstract Conceptualization between participants involved in team sports and those involved in individual sports ($p < 0.05$). Specifically, participants in individual sports scored higher on this dimension. The analysis revealed a small effect size ($r = 0.15$), indicating a modest but statistically significant divergence in this learning dimension.

However, no significant differences were found in the dimensions of Active Experimentation, Reflective Observation, or Concrete Experience between the two groups. Figure 2 illustrates the

mean scores (\pm SE) for each dimension, comparing team sport and individual sport participants.

Discussion

The aim of this study was to explore the learning style preferences of college students in physical education, with particular focus on the associations with gender, high school diploma, and categories of sports. The results provide significant insights into the prevalence of certain learning styles and their links to contextual factors.

The accommodating learning style emerged as the most prevalent, preferred by 45.6% of participants. This style, characterized by active experimentation and concrete experience [26], aligns with the hands-on, dynamic nature of sports and physical education. Individuals with this learning style thrive in environments requiring adaptability and quick decision-making, excelling in physical activities and real-time problem-solving [27]. Research indicates that the accommodating style is particularly common among students in sports therapy and related fields, where practical application and experiential learning are key components of education [16]. The interactive nature of sports and physical education complements this learning approach, as it requires direct engagement with the environment and the application of theoretical knowledge in practical settings [28].

The divergent style was the second most common (27.8%), reflecting an emphasis on creativity and multiple perspectives. In contrast, assimilating and convergent styles were less prevalent (12.8% and 13.9%, respectively). These findings highlight the dominance of experiential, action-oriented learning in physical education, with limited engagement in reflective or theoretical approaches. The accommodating style's emphasis on direct experience and active participation fosters skill development through practice, which is essential in sports, where hands-on learning is often more effective than theoretical instruction alone [29]. Additionally, this learning style encourages initiative and self-directed learning, promoting independence, a valuable trait in physical education and athletic training [30].

Previous research similarly highlights the prevalence of experiential learning among students in sports disciplines, reflecting their need for real-time problem-solving and hands-on activities [13, 14]. In contrast, fewer students demonstrated a preference for divergent or assimilative learning styles, which focus more on reflective observation and abstract conceptualization [12]. This indicates a limited emphasis on theoretical or analytical activities within the curriculum and suggests an opportunity to integrate reflective and conceptual learning tasks to broaden students' competencies. The lower prevalence of divergent and assimilative

styles in this context suggests that reflective observation and abstract conceptualization are less emphasized in the physical education curriculum. This gap may represent an opportunity for educators to incorporate activities that promote critical thinking, analysis, and theoretical understanding, complementing students' existing strengths.

Our study revealed no significant differences in learning style preferences between male and female students across the four dimensions of Kolb's model: Active Experimentation (AE), Reflective Observation (RO), Abstract Conceptualization (AC), and Concrete Experience (CE). Both genders demonstrated comparable distributions of preferences, with a slight predominance for active and pragmatic styles. These findings align with previous research by Wehrwein, Lujan [31], which also reported no significant gender-based differences in learning preferences when assessed using the VARK questionnaire (visual, auditory, reading/writing, kinesthetic). Similarly, studies in medical education [32] and physical education [33] found minimal gender variations, with students of both sexes often favoring multimodal learning.

Conversely, other studies [34, 35] have identified gender-related differences, suggesting that males and females may adopt distinct approaches to processing information. For instance, some research notes a slightly higher frequency of reflective styles among female learners, though not at a level indicating strong divergence [36]. The lack of gender differences in our study could be attributed to the specific context of the participants' educational environment, which may foster similar learning strategies regardless of gender. The predominance of active and pragmatic styles in both groups might reflect the influence of the physical education curriculum, which emphasizes hands-on activities and experiential learning [37]. These contextual factors, especially in fields that prioritize kinesthetic or applied methods, likely contribute to minimizing gender-based variations in learning preferences.

The results indicate a significant difference between sports and non-sports baccalaureate students in active and experimental learning, with non-sports baccalaureate students demonstrating a stronger preference for these learning approaches. This suggests that prior academic training influences learning preferences [38], with students from non-sports backgrounds potentially compensating for a lack of practical experience by emphasizing active engagement. Additionally, no significant correlations were found for the other dimensions (RO, AC, or CE), indicating that the high school diploma has a limited impact on learning preferences beyond active experimentation. These findings align with other studies highlighting the importance of intuition across educational domains [39, 40].

The study by [40] made a significant contribution

by emphasizing the critical role of intuition in sports. The researchers examined how coaches in adventure sports and rugby use intuition when making decisions. In contrast, these results diverge from other studies [41], which identified the role of action in sports contexts. That study underscored the importance of action in sports, followed by an intervention phase involving handball, football, and volleyball seasons, during which identified issues were addressed through active engagement.

Categories of sports emerged as a key factor influencing learning style preferences. Students specializing in team sports predominantly favored the intuitive-pragmatic (accommodating) learning style, characterized by active experimentation and collaborative approaches. In contrast, students specializing in individual sports exhibited higher levels of AC and RO, indicating a stronger preference for introspection and analytical thinking. The significant difference in AC among individual sport participants suggests that the cognitive demands of these disciplines, such as strategic planning and self-assessment, promote reflective learning. This observation supports the idea that learning preferences are shaped by students' academic backgrounds and by the contexts in which they have previously engaged with educational content [42, 43].

Our study's findings are consistent with those of [39], as they also suggest that participation in team sports can influence the use of practical styles in interactions with teammates. This indicates that the specific context of team sports may foster the development of practical skills and the implementation of collaborative strategies. Similar studies have also revealed that participants in individual sports are more action-oriented during gameplay, with their learning based on repetition [44].

This study highlights the importance of adopting diverse teaching strategies that accommodate various learning styles. Integrating methods that balance active, reflective, and conceptual approaches can create a more inclusive learning environment. For example, incorporating case studies, reflective exercises, and theoretical discussions alongside practical activities could enhance both engagement and knowledge retention. Such a comprehensive approach not only respects students' existing preferences but also equips them with the skills necessary for complex problem-solving and decision-making in professional settings. These findings underscore the importance of differentiated teaching strategies in sports education programs to accommodate diverse learning styles. For students with an accommodating style (dominant in team sports), educators should prioritize hands-on drills, simulations, and collaborative projects to leverage their preference for active experimentation. Conversely, learners in individual sports, who showed higher reflective and analytical tendencies,

may benefit from structured self-assessments, video analysis, and tactical discussions to deepen their assimilative skills. Additionally, students from non-sports academic backgrounds could thrive with scaffolded practical sessions to build confidence in active learning, while those with sports diplomas might need support in integrating abstract concepts, such as sport science theories. By tailoring methods to these preferences, programs can enhance engagement, skill transfer, and the balance between theoretical and practical learning, ultimately fostering more inclusive and effective sports education.

Limitations

This study has several limitations. First, its cross-sectional design prevents analysis of changes in learning preferences over time. Second, the sample was drawn from a single institution, which may limit the generalizability of the findings. Future research should consider longitudinal and multi-site designs to explore the potential influence of cultural and institutional contexts on learning style development. Addressing these limitations could provide a more comprehensive understanding of how diverse variables shape learning in physical education.

Conclusions

This study highlights the predominance of the accommodating learning style among physical education students, characterized by active experimentation and well aligned with the discipline's hands-on and practical nature. The findings also reveal nuanced influences of sport specialization (individual versus team sports) and academic background on learning style preferences.

To optimize pedagogy, educators are encouraged to incorporate reflective and theoretical tasks for students involved in individual sports and for those with sport-specific diplomas, who may benefit from deeper conceptual engagement. Simultaneously, students from non-sports academic backgrounds may benefit from scaffolded practical learning experiences to build confidence in active experimentation.

By tailoring instructional strategies to these varied learning needs, physical education curricula can more effectively bridge practical and theoretical learning. Such differentiation not only enhances student engagement and knowledge retention but also promotes holistic development, preparing students for the cognitive, technical, and interpersonal demands of future professional practice.

Conflict of interest

The authors declare that they have no conflicts of interest.

References

1. Bahri N. Les inégalités d'accès à l'éducation des enfants en Tunisie [Inequalities in access to education for children in Tunisia]. *GPH-International Journal of Educational Research*. 2024;7(01):31–41. (In French).
2. Bousnina A. Le genre et les inégalités éducatives régionales en Tunisie [Gender and regional educational inequalities in Tunisia]. *Espace Géographique et Société Marocaine*. 2024;1(84). (In French)
3. Kolb DA, Boyatzis RE, Mainemelis C. Experiential Learning Theory: Previous Research and New Directions. In: Sternberg RJ, Zhang L fang (eds.) *Perspectives on Thinking, Learning, and Cognitive Styles*, 0 ed. Routledge; 2014. P. 227–248. <https://doi.org/10.4324/9781410605986-9>
4. Alemdağ C, Alemdağ S, Özkara A. The Analysis of Sports High School Students' Learning Styles in Terms of Overall Academic Success. *Education and Science*, 2018;43(195): 269–278. <https://doi.org/10.15390/EB.2018.7327>
5. Li Y. Practical research on orienteering physical education in universities in northeast China. *Technology and Health Care*, 2021;29: 275–286. <https://doi.org/10.3233/THC-218025>
6. Sternberg RJ. Allowing for Thinking Styles. *Educational leadership*. 1994;52(3):36–40.
7. Cabual RA. Learning Styles and Preferred Learning Modalities in the New Normal. *OALib*, 2021;08(04): 1–14. <https://doi.org/10.4236/oalib.1107305>
8. Cid FM, Bahamondes VV. Estilos de aprendizaje de Kolb de estudiantes de educación física de la UMCE y UISEK de Chile [Kolb learning styles of physical education students at UMCE and UISEK in Chile]. *Revista de Estilos de Aprendizaje*. 2013;6(11). (In Spanish). <https://doi.org/10.55777/rea.v6i11.976>
9. Maureira F, Durán F, Pastén S, Herrera MP, Urquero P, Opazo L. Independencia de los estilos de aprendizaje de Kolb y las inteligencias múltiples en estudiantes de Educación Física de la USEK de Chile [Independence of Kolb's learning styles and multiple intelligences in physical education students at USEK, Chile]. *Psiquiatría Universitaria*. 2015;11(2):209–15. (In Spanish).
10. Alemdağ C. Changes in learning style preferences of physical education students. *Center for Educational Policy Studies Journal*, 2020. <https://doi.org/10.26529/cepsj.613>
11. Sato T, Laughlin DD. Integrating Kolb's Experiential Learning Theory into a sport psychology classroom using a golf-putting activity. *Journal of Sport Psychology in Action*, 2018;9(1): 51–62. <https://doi.org/10.1080/21520704.2017.1325807>
12. Cadarin Nicolette P, Herpich F, De Oliveira Júnior ET, Machado Da Silva MA, Rockenbach Tarouco LM. Analysis of Learning Styles of Students Enrolled in a Technical Course in Electromechanics with the Application of the Inventory of Kolb. *Tecné, Episteme y Didaxis: TED*, 2023;(53): 63–81. <https://doi.org/10.17227/ted.num53-14128>
13. Cid FM, Ferro EF, Muñoz HD, Contreras LV. Learning Styles in Physical Education. In: Llevot-Calvet N, Cavero OB (eds.) *Advanced Learning and Teaching Environments - Innovation, Contents and Methods*. InTech; 2018. <https://doi.org/10.5772/intechopen.72503>
14. Gómez-Terán ÓÁ, Garza-González B, Hernández-Castañón MaA, Castrejón-Reyes V, Cortés-Heredia SJ. Estilos de aprendizaje en los estudiantes de Educación Física y Ciencias del Deporte de la Universidad Autónoma de Querétaro [Learning styles in students of Physical Education and Sports Science at the Autonomous University of Querétaro]. *RIDE Revista Iberoamericana para la Investigación y el Desarrollo Educativo*. 2019;10(19). <https://doi.org/10.23913/ride.v10i19.582>
15. West KJ. Learning styles and gendered traits. *Learning*. 2013;11:24–34.
16. Holland C, Mills CD. Profiling sports therapy students' preferred learning styles within a clinical education context. *Journal of Learning Development in Higher Education*, 2015;(9):1–19. <https://doi.org/10.47408/jldhe.v0i9.264>
17. Steffen W, Meany B. An Investigation of Soccer Coaches' Preferred Learning Style and Gender. *Journal of Advances in Sports and Physical Education*, 2022;5(2): 11–15. <https://doi.org/10.36348/jaspe.2022.v05i02.001>
18. Garrison TL. *A Synthesis of Research on Learning Styles* [Master's Thesis]. Brockport (NY): State University of New York College at Brockport; 2005.
19. Zaky M, Untara KAA, Tang I, Alfito A, Waenggo O. Exploration of Learning Style Preferences Among High School Students in the Context of Physics Education: An Empirical Analysis Using Kolb's Learning Style Inventory (KLSI). *Berkala Ilmiah Pendidikan Fisika*, 2024;12(3): 425. <https://doi.org/10.20527/bipf.v12i3.19122>
20. Ben-David Kolikant Y, Pollack S. Collaborative, Multi-perspective Historical Writing: The Explanatory Power of a Dialogical Framework. *Dialogic Pedagogy: An International Online Journal*, 2019;7. <https://doi.org/10.5195/dpj.2019.245>
21. Al Shaikh A, Aldarmahi AA, AL-Sanie E, Subahi A, Ahmed ME, Hydrie MZ, et al. Learning styles and satisfaction with educational activities of Saudi Health Science University Students. *Journal of Taibah University Medical Sciences*, 2019;14(5): 418–424. <https://doi.org/10.1016/j.jtumed.2019.07.002>
22. ALQahtani DA, Al-Gahtani SM. Assessing Learning Styles of Saudi Dental Students Using Kolb's Learning Style Inventory. *Journal of Dental Education*, 2014;78(6): 927–933. <https://doi.org/10.1002/j.0022-0337.2014.78.6.tb05747.x>
23. BuAli W, Balaha M, Muhaidab N. Assessment of Learning Style in a Sample of Saudi Medical Students. *Acta Informatica Medica*, 2013;21(2): 82. <https://doi.org/10.5455/aim.2013.21.83-88>
24. Kolb DA. *The Kolb learning style inventory: Hay Resources Direct Boston*. MA; 2007.
25. Fritz CO, Morris PE, Richler JJ. Effect size estimates: Current use, calculations, and interpretation. *Journal*

- of *Experimental Psychology: General*, 2012;141(1): 2–18. <https://doi.org/10.1037/a0024338>
26. Javed M. The Effectiveness of Different Teaching Methods in Education: A Comprehensive Review. *Journal of Social Signs Review*, 2023;1(1):17–24.
 27. Bayu IMA, Nita P, Fahritsani H. Adaptive Sports Learning in Physical Education: Theory and Practice for Physical Education (PE) Students. *Musamus Journal of Physical Education and Sport (MJPES)*. 2024;6(2):274–80.
 28. Coker CA. *Motor Learning and Control for Practitioners..* 4th ed. Fourth edition. | Abingdon, Oxon; New York, NY: Routledge; 2017. <https://doi.org/10.4324/9781315185613>
 29. Nelson LP, Crow ML. Do Active-Learning Strategies Improve Students’ Critical Thinking? *Higher Education Studies*, 2014;4(2):p77. <https://doi.org/10.5539/hes.v4n2p77>
 30. Cleary TJ, Zimmerman BJ, Keating T. Training Physical Education Students to Self-Regulate During Basketball Free Throw Practice. *Research Quarterly for Exercise and Sport*, 2006;77(2): 251–262. <https://doi.org/10.1080/02701367.2006.10599358>
 31. Wehrwein EA, Lujan HL, DiCarlo SE. Gender differences in learning style preferences among undergraduate physiology students. *Advances in Physiology Education*, 2007;31(2): 153–157. <https://doi.org/10.1152/advan.00060.2006>
 32. Slater JA, Lujan HL, DiCarlo SE. Does gender influence learning style preferences of first-year medical students? *Advances in Physiology Education*, 2007;31(4): 336–342. <https://doi.org/10.1152/advan.00010.2007>
 33. Ardila CM, Gómez-Restrepo ÁM. Relationship between physical activity, academic achievement, gender, and learning styles in students of a Latin American Dental School: A cross-sectional study. *Journal of Education and Health Promotion*, 2021;10(1): 149. https://doi.org/10.4103/jehp.jehp_646_20
 34. Braakhuis A, Williams T, Fusco E, Hueglin S, Popple A. A Comparison between Learning Style Preferences, Gender, Sport and Achievement in Elite Team Sport Athletes. *Sports*, 2015;3(4): 325–334. <https://doi.org/10.3390/sports3040325>
 35. Severiens SE, Ten Dam GTM. Gender differences in learning styles: A narrative review and quantitative meta-analysis. *Higher Education*, 1994;27(4): 487–501. <https://doi.org/10.1007/BF01384906>
 36. Shine LR. *Quantitative analysis of the gender differences in learning styles of IT professionals and the impact on leadership outcomes: Implications for STEM*. Capella University; 2016.
 37. Thiri Y, Oo MT, Ko AN, Paw NTML, Guirguis JM. The Hands-on Learning Impact to Learning Engagement. *11th International Scholars Conference*, 2024;11(4): 1017–1033. <https://doi.org/10.35974/isc.v11i4.3473>
 38. Eltantawy A. Preferred learning styles among faculty of physical education students in management, training and teaching branches—comparative study. *Ovidius University Annals, Series Physical Education and Sport/Science, Movement and Health*. 2019;19(2):75–81.
 39. Waks LJ. Intuition in Education: Teaching and Learning Without Thinking. *Philosophy of Education*, 2006;62: 379–388. <https://doi.org/10.47925/2006.379>
 40. Collins D, Collins L, Carson HJ. “If It Feels Right, Do It”: Intuitive Decision Making in a Sample of High-Level Sport Coaches. *Frontiers in Psychology*, 2016;7:1–10. <https://doi.org/10.3389/fpsyg.2016.00504>
 41. Farias C, Segovia Y, Valério C, Mesquita I. Does Sport Education promote equitable game-play participation? Effects of learning context and students’ sex and skill-level. *European Physical Education Review*, 2022;28(1): 20–39. <https://doi.org/10.1177/1356336X211013832>
 42. Biggs J, Kember D, Leung DYP. The revised two-factor Study Process Questionnaire: R-SPQ-2F. *British Journal of Educational Psychology*, 2001;71(1): 133–149. <https://doi.org/10.1348/000709901158433>
 43. Felder R. Learning and Teaching Styles in Engineering Education. *Engineering Education*, 1988;78(7):674–81.
 44. Slutzky CB, Simpkins SD. The link between children’s sport participation and self-esteem: Exploring the mediating role of sport self-concept. *Psychology of Sport and Exercise*, 2009;10(3):381–389. <https://doi.org/10.1016/j.psychsport.2008.09.006>

Information about the authors:

Ahmed Ghorbel; (Corresponding Author); <https://orcid.org/0009-0004-6890-9867>; Ahmed.ghorbel@isseps.usf.tn; Research Unit: Physical Activity, Sport and Health, UR18JS01, National Observatory of Sport (Tunis, Tunisia); The High Institute of Sport and Physical Education, University of Jendouba (Kef, Tunisia).

Med Moncef Kammoun; <https://orcid.org/0009-0001-9431-1875>; moncefkammoun@yahoo.fr; The High Institute of Sport and Physical Education, University of Sfax; Sfax, Tunisia.

Mohamed Yaakoubi; <https://orcid.org/0009-0003-5187-236X>; mohamed.yaakoubi@isseps.usf.tn; Research Unit: Physical Activity, Sport and Health, UR18JS01, National Observatory of Sport (Tunis, Tunisia); The High Institute of Sport and Physical Education, University of Jendouba (Kef, Tunisia).

Omar Trabelsi; <https://orcid.org/0000-0001-6545-4706>; omar.trabelsi@issepk.rnu.tn; Research Unit: Physical Activity, Sport and Health, UR18JS01, National Observatory of Sport (Tunis, Tunisia); The High Institute of Sport and Physical Education, University of Jendouba (Kef, Tunisia).

Liwa Masmoudi; <https://orcid.org/0000-0002-9628-1585>; liwa.masmoudi@isseps.usf.tn; Research Unit: Physical Activity, Sport and Health, UR18JS01, National Observatory of Sport (Tunis, Tunisia); The High Institute of Sport and Physical Education, University of Sfax (Sfax, Tunisia).

Adnen Gharbi; <https://orcid.org/0000-0001-9971-1993>; adnenegharbi@yahoo.fr; Research Unit: Physical Activity, Sport and Health, UR18JS01, National Observatory of Sport (Tunis, Tunisia); The High Institute of Sport and Physical Education, University of Sfax (Sfax, Tunisia).

Cite this article as:

Ghorbel A, Kammoun MM, Yaakoubi M, Trabelsi O, Masmoudi L, Gharbi A. Learning styles of college students in physical education: insights from Kolb's experiential learning theory. *Physical Education of Students*, 2025;29(5):330–339.

<https://doi.org/10.15561/20755279.2025.0501>

This is an Open Access article distributed under the terms of the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited <http://creativecommons.org/licenses/by/4.0/deed.en>

Received: 02.06.2024

Accepted: 07.09.2025; Published: 30.10.2025