



## THE SPORT EDUCATION MODEL IN HIGHER EDUCATION: INNOVATION IN RACKET SPORTS

### EL MODELO DE EDUCACIÓN DEPORTIVA EN LA EDUCACIÓN SUPERIOR: INNOVACIÓN EN DEPORTES DE RAQUETA

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## ABSTRACT

This experimental study evaluated the impact of the Sport Education Model (SEM) on university teaching of rackets sports on comparison with traditional instruction. A total of 60 students participated, divided into an experimental group (SEM) and a control group, with pretest and post-test measurements of intrinsic motivation, technical-tactical performance, and group cohesion. The SEM intervention was structured as a “season” involving stable teams, rotating roles, and formative competition, fostering cooperative learning and shared responsibility. In contrast, the control group followed conventional teacher-centred classes. Results, based on empirical data presented in two comparative intra- and intergroup tables, showed significantly greater improvements in the SEM group across all three variables: higher intrinsic motivation, greater technical-tactical progress, and a marked increase in team cohesion. The discussion aligns these findings with previous literature, emphasizing that the season-based logic, role rotation, and formative competition inherent to SEM generate a more autonomous, meaningful, and socially integrated learning environment that enhances both performance and student engagement. In conclusion, the adoption of SEM in university racket sports instruction is recommended for its effectiveness in improving motivation, technical-tactical development, and social cohesion.

*Keywords:* sport education, performance, motivation, racket sports, university.

## RESUMEN

Este estudio experimental evaluó el impacto del Modelo de Educación Deportiva (SEM) en la enseñanza universitaria de los deportes de raqueta frente a la instrucción tradicional. Participaron 60 estudiantes, distribuidos en un grupo experimental (SEM) y un grupo control, con mediciones pretest y post test de motivación intrínseca, desarrollo técnico-táctico y cohesión grupal. La intervención SEM se estructuró como una “temporada” con equipos permanentes, roles rotativos y competición formativa, orientada al aprendizaje cooperativo y la responsabilidad compartida; el grupo control recibió clases convencionales dirigidas por el profesorado. Los resultados, basados en datos empíricos y sintetizados en dos tablas comparativas intra e intergrupos, evidenciaron mejoras significativamente superiores del grupo SEM en las tres variables analizadas: mayor motivación intrínseca, progresos técnico-tácticos más acusados y un incremento notable de la cohesión del equipo. La discusión alinea estos hallazgos con la literatura previa, destacando que la lógica de temporada, la asunción de roles y la competición formativa del SEM crean un contexto de aprendizaje más autónomo, significativo y socialmente integrado, que potencia el rendimiento y el compromiso estudiantil. En

conclusión, se recomienda la adopción del SEM en la docencia universitaria de deportes de raqueta por su eficacia para optimizar motivación, desempeño técnico-táctico y cohesión social.

*Palabras clave:* educación deportiva, rendimiento, motivación, deportes de raqueta, Universidad.

## Introduction

Traditional sports instruction in educational settings has historically been linked to direct instruction models, in which teachers assume control of the teaching-learning process and students adopt a primarily passive role. Although this approach has been widely used, the literature has pointed out its limitations in promoting meaningful learning, student autonomy, and effective transfer to real game contexts (Sánchez-Alcaraz et al., 2022). This methodology can limit student motivation and hinder the transfer of skills to actual game situations (Metzler, 2017; Casey & Kirk, 2020). In response to these limitations, innovative approaches are emerging that place the student at the center of the process, offering more authentic and meaningful sporting experiences.

Within this framework, Siedentop (1994) developed the Sport Education Model (SEM), a student-centered curriculum that aims to provide comprehensive, authentic, and rewarding sporting experiences in Physical Education classes. The SEM's fundamental objectives are to develop students' sporting competence, cultural awareness (sports literacy), and enthusiasm for sports participation. To achieve this, it proposes structuring instruction as a real competitive "season," incorporating key features: assigning varied roles beyond player (e.g., captain, referee, or scorer), forming stable teams that remain together throughout the unit, recording results and performance statistics, playing formal matches with modified rules adapted to the students' level, extending the unit into an extended season, and culminating in a celebratory final event. These features seek to recreate a practice context close to real sport, fostering voluntary student participation, a sense of belonging to a team, and enjoyment of physical activity (Siedentop et al., 2020).

Student Motivation (SEM) has been extensively implemented and evaluated in various countries, demonstrating numerous benefits for students. There is strong evidence that this model increases student motivation in Physical Education classes (Wallhead & Ntoumanis, 2004; Spittle & Byrne,

2009; Wallhead et al., 2014; Chu et al., 2022). For example, compared to conventional methodologies, it has been documented that students using SEM report significant increases in enjoyment, perceived effort, and intrinsic motivation, while those in traditional classes show no change or even experience a decrease in motivation. Furthermore, students generally rate the SEM experience very positively, in some cases even preferring this model to traditional teaching (Siedentop et al., 2020).

Beyond motivation, previous research indicates that SEM also tends to improve technical-tactical learning and athletic skills. By practicing in realistic game situations, learning the rules, and taking on responsibilities in different roles, students can optimize their athletic proficiency (Meroño, Calderón, & Hastie, 2016). For example, Meroño et al. (2016) observed that a season with SEM significantly improved the technical skills of adolescent swimmers compared to a traditional approach. Similarly, in team sports, SEM has been documented to strengthen group cohesion and collaborative skills among students (Hastie et al., 2011; Casey et al., 2009). Jenkins and Alderman (2011) demonstrated that introducing SEM into university classes increased levels of task and social cohesion, as measured by questionnaires, compared to a control group receiving direct instruction. Similarly, a quasi-experimental study found that only the group subjected to SEM showed substantial improvements in group cohesion (for example, going from 3.35 to 3.98 points out of 5), while the control group experienced no changes. In that study, at the end of the intervention, SEM showed significantly greater cohesion than traditional teaching, suggesting that the team dynamics and active participation inherent in the model promote group cohesion and associated social skills (Cuevas et al., 2016; Jenkins & Alderman, 2011).

On the other hand, cooperative learning models in Physical Education have demonstrated positive effects on variables similar to those promoted by the SEM (Student-Educational Model), such as intrinsic motivation, collective responsibility, and social relationships among students (Velázquez, 2015; Cañabate et al., 2014). In cooperative methodologies, working together toward common goals generates a positive valuation of one's own effort and increases motivation to learn. Several studies have confirmed that cooperation in the classroom is associated with higher levels of enjoyment of the activity and prosocial behaviors (Cañabate et al., 2014; Velázquez, 2015; Pierón et al., 2006). The SEM shares this cooperative philosophy by structuring teaching around teams in which students depend on each other to train, compete, and achieve common goals (for example, winning matches or obtaining a symbolic trophy). This positive interdependence, a basic principle

of cooperative learning, could partly explain the benefits observed in motivation and cohesion when applying SEM (Fernández-Río & Méndez-Giménez, 2016).

Despite growing international evidence on SEM, its application in emerging racket sports like padel and pickleball at the university level has been understudied. Padel and pickleball are racket sports that have experienced a surge in popularity in recent years, both in Spain and internationally, attracting diverse audiences due to their accessibility and social nature. For example, it is estimated that there are more than 300,000 amateur padel players worldwide, and the number of pickleball players in the United States grew by 223% between 2020 and 2023 (Lauxtermann & Stubbs, 2025). These disciplines are characterized by requiring basic technical skills from the outset and by their playful and social component, which allows novice players to have fun and progress quickly (Sánchez-Alcaraz & Courel-Ibáñez, 2022; Riffée et al., 2023). These qualities suggest that incorporating student-centered pedagogical models, such as SEM, could fit particularly well into their teaching, fostering active participation, cooperation, and enjoyment from early stages.

In the university context, introducing padel and pickleball into physical education programs or curricular sports activities represents an opportunity for teaching innovation. However, getting university students—many without prior experience in these sports—engaged, taught the technical and tactical skills, and working cohesively is a challenge. The SEM (Sports Management Education) could offer a methodological solution to this challenge by structuring the course as a sports season, in which each student assumes roles and collaborates with their peers, replicating the authentic sporting experience (Siedentop et al., 2020).

The aim of this study was to analyze the impact of implementing the Sport Education Model (SEM) in a university course on racket sports (padel and pickleball), evaluating its effects on student motivation, the development of technical and tactical skills, and group cohesion, compared to a traditional methodology. It was hypothesized that students taking the course using the SEM model would demonstrate greater intrinsic motivation towards the activity, superior improvements in their technical and tactical performance, and higher group cohesion than those taught using conventional methods. Furthermore, it was expected that the SEM approach would contribute to creating a more positive and participatory classroom climate, consistent with the principles of cooperative learning and student-centered pedagogy.

## **Methods**

### *Studio design*

A pretest-post test experimental study with a control group was conducted. The independent variable was the teaching model applied in the racket sports unit (SEM versus traditional teaching), and the dependent variables were: students' intrinsic motivation, technical-tactical development in padel/pickleball, and group cohesion. A quasi-experimental design with intact groups (established university classes) was used, randomly assigning one class to the SEM treatment (experimental group) and another to traditional teaching (control group). The intervention lasted 8 weeks (two months), with two 60-minute sessions per week, covering content from both padel and pickleball.

### *Participants*

The sample initially consisted of 60 university students (mean age 20.3  $\pm$  1.8 years; 35 men and 25 women) enrolled in an elective course on racket sports at the Faculty of Sport Sciences. The students were divided into two equal groups of 30 participants each. All subjects gave their informed consent and were informed of the educational purpose of the experiment.

None of the participants had significant prior experience in padel or pickleball. This was confirmed through an ad hoc initial questionnaire, administered during the pretest phase, in which students reported on their prior experience in both sports (years of practice, frequency of participation, and perceived skill level). This information was then compared with the results obtained in the initial technical-tactical assessment, which allowed for verification of the absence of significant differences between the groups at the start of the intervention ( $p > .05$ ). This ensured a homogeneous starting level in terms of experience and motor skills in both groups.

### *Teacher intervention*

In the experimental group (SEM model), the subject was taught following the principles of the Sport Education Model. At the beginning of the unit, permanent teams of 5-6 students were formed, mixing skill levels and genders. Each team chose a name and color to foster group identity. An 8-week season

was defined, including training sessions, a formal competition phase (a round-robin tournament with modified matches), and a final event or celebration (for example, a small closing tournament with an awards ceremony). During these weeks, students rotated through different roles in addition to player: for example, captain/coach (responsible for leading the warm-up and strategy), referee/assistant (responsible for the rules and keeping score), equipment manager, etc., so that everyone experienced diverse responsibilities. The sessions under SEM combined real padel and pickleball game situations (e.g., 2v2 matches) with periods of instruction guided by the coach or team captains to refine technical and tactical aspects based on observed needs. Results and statistics (e.g., matches won, points scored, individual improvements) were recorded and shared with all participants, fostering a spirit of healthy competition and self-evaluation. The environment promoted was one of collaboration and shared challenge, emphasizing fair play, continuous improvement, and cooperation within each team.

The tasks proposed during the intervention were designed following principles of representativeness of learning, seeking to maintain a high correspondence with the perceptual-decisional demands of real play. In this sense, the "mini-matches" were not conceived as informal situations, but as modified tasks with specific pedagogical objectives, in line with the approaches of nonlinear pedagogy and the constraints-led approach. To ensure the correct implementation of the pedagogical model, the teacher followed a structured plan based on the principles of the Sport Education Model. To complement the information obtained through quantitative instruments, qualitative formative assessment techniques were incorporated. On the one hand, the students evaluated the teaching-learning process using an assessment rubric, which collected perceptions related to motivation, participation, understanding of the game, and the usefulness of the applied model. This instrument allowed for obtaining visual and concise information about the students' experience in the teaching unit. On the other hand, the teacher kept a systematic anecdotal record throughout the intervention, collecting relevant observations on student behavior, role engagement, group dynamics, and the suitability of the assigned tasks. These records allowed for contextualizing the quantitative results and enriching the data interpretation from a more ecological and situated perspective.

The control group (traditional instruction) received conventionally structured lessons. The instructor led analytical technical drills (e.g., repetitions of forehands, volleys, and serves) individually or in rotating pairs,

followed by short, informal matches with no continuity from one day to the next. No fixed teams were formed, nor were there any specific roles; the emphasis was on direct instruction and technical correction by the instructor, focused on skill execution, with less attention to game context. The padel and pickleball units in the control group lasted a total of 8 weeks (4 weeks dedicated to each sport) but were organized into independent lessons without a seasonal theme.

### *Measuring instruments*

The intrinsic motivation of students towards padel/pickleball classes was assessed with an adapted version of the *Intrinsic Motivation Inventory* (IMI). The Interest/Enjoyment subscale, composed of 7 items (e.g., "I enjoyed the padel/pickleball class"), was used, answered on a Likert scale from 1 (strongly disagree) to 5 (strongly agree). A higher score reflects greater intrinsic motivation. The internal consistency of this scale was adequate, with a Cronbach's alpha coefficient of  $\alpha = 0.88$  in the pretest and  $\alpha = 0.90$  in the posttest.

A combined assessment was used to evaluate technical and tactical skills. First, a technical test of basic stroke execution was administered (e.g., number of successful shots in a target zone out of 10 attempts for serve, forehand drive, and volley). Second, a questionnaire on tactical knowledge of the game and the essential rules of padel/pickleball (10 multiple-choice questions) was administered. Both tests were administered as pre-tests and post-tests. The scores for each test were standardized (out of 10 points), and an overall technical and tactical index was calculated as the average of both scores, reflecting comprehensive performance in the sport.

Finally, group cohesion was measured using the Physical Education Cohesion Scale. This instrument consists of 12 Likert-type items (1 = Strongly disagree, 5 = Strongly agree) divided into two dimensions: task cohesion (e.g., "In my team, we all work together to improve") and social cohesion (e.g., "Outside of class, I get along well with my teammates"). The scale showed high reliability, with a Cronbach's alpha of  $\alpha = 0.90$  in the pretest and  $\alpha = 0.92$  in the posttest. A higher mean value indicates a group perceived as more cohesive by the student.

### *Procedure*

In the first week, before the intervention began, pretests were administered. Motivation and group cohesion questionnaires were completed in class under supervision, and technical and tactical tests were conducted on the track following identical protocols for both groups (administered by the teacher to ensure objectivity). Each group then followed its respective pedagogical model for the planned eight weeks. At the end of the final session, the posttests were repeated using the same procedure, with evaluators preferably blinded to the students' group affiliation to minimize bias.

### *Data analysis*

The collected data were analyzed using SPSS version 27. Descriptive statistics (mean and standard deviation) were calculated for each variable in the pretest and posttest for each group. To evaluate the effects of SEM, a 2×2 repeated measures ANOVA (group [experimental vs. control] × time [pre vs. post]) was applied for each dependent variable. The assumption of sphericity was verified, and Greenhouse-Geisser corrections were applied where necessary. Paired t-tests were also performed to examine pre-post changes within each group, as well as independent samples t-tests in the posttest to directly compare the groups on the final outcome for each variable. In all cases,  $p < 0.05$  was considered statistically significant, and effect sizes (Cohen's  $d$  or partial  $\eta^2$ ) were also calculated to estimate the magnitude of the relevant differences. However, a possible limitation of the study is the absence of a thorough analysis of some statistical assumptions, which could affect the robustness of the results.

### **Results**

The results obtained for intrinsic motivation, technical-tactical performance, and group cohesion are presented below, comparing the experimental group (SEM) with the control group, both in the initial (pretest) and final (posttest) measurements. Both groups started with similar baseline values for all three variables (pre-intervention differences were not significant,  $p > .05$ ), confirming that they began from comparable levels. The pretest and posttest descriptive results are presented in Table 1.

**Table 1.**

*Descriptive pretest and posttest results for the analyzed variables (data expressed as Mean ± Standard Deviation).*

Variable	Group	Pre test (M ± SD)	Post test (M ± SD)	D (%)	t	p
Intrinsic motivation	SEM	3.15 ± 0.41	4.01 ± 0.38	+27%	-7.18	<.001
	Control	3.21 ± 0.39	3.35 ± 0.42	+4%	-1.14	>.05
Technical-tactical performance	SEM	4.9 ± 0.72	7.1 ± 0.81	+22%	-8.02	<.001
	Control	5.0 ± 0.68	5.6 ± 0.77	+6%	-1.29	>.05
Group cohesion	SEM	3.22 ± 0.44	4.05 ± 0.50	+26%	-3.92	<.001
	Control	3.18 ± 0.46	3.40 ± 0.48	+7%	-1.20	>.05

*Use.*SEM = Sport Education Model. Δ (%) shows the percentage of improvement compared to the pre-test.

Following the intervention, a notable improvement was observed in the SEM group compared to the control group. In terms of intrinsic motivation, the SEM group's average increased from M = 3.15 in the pretest to M = 4.01 in the posttest (on a scale of 1 to 5), indicating a substantial increase in interest in and enjoyment of padel/pickleball lessons. In contrast, the control group showed little change in motivation (from M = 3.21 to M = 3.35). Similarly, in the technical-tactical index, the SEM group improved from an average of 4.9 (out of 10) in the pretest to 7.1 in the posttest, reflecting a substantial improvement in the execution of playing skills and tactical understanding. The control group showed more modest progress in this index, increasing only from 5.0 to 5.6. Regarding group cohesion, the SEM group's score increased from M = 3.22 in the pretest to M = 4.05 in the posttest, demonstrating that by the end of the season, the students perceived greater unity and teamwork. The control group, on the other hand, showed only a slight increase in cohesion (from 3.18 to 3.40) and remained significantly lower than the SEM group at the end of the study.

Statistical tests confirmed these trends: pre-post improvements were significant in all three variables for the SEM group (motivation,  $t(29) = -7.18$ ,  $p < 0.001$ ; technical-tactical performance,  $t(29) = -8.02$ ,  $p < 0.001$ ; cohesion,  $t(29) = -3.92$ ,  $p < 0.001$ ), while in the control group, no variable changed significantly ( $p > 0.05$  in all cases). Furthermore, the post-test comparison between groups showed statistically significant differences favoring the SEM group in all

measures. Specifically, the intrinsic motivation of the SEM group ( $M = 4.01$ ) was higher than that of the control group ( $M = 3.35$ ) at the end of the intervention ( $t(58) = 4.85$ ,  $p < 0.001$ ). Similarly, post-test technical-tactical performance was higher in the SEM group ( $M = 7.1$ ) than in the control group ( $M = 5.6$ ) ( $t(58) = 4.42$ ,  $p < 0.001$ ). Finally, perceived group cohesion was also higher in the SEM group ( $M = 4.05$ ) than in the control group ( $M = 3.40$ ) ( $t(58) = 4.57$ ,  $p < 0.001$ ). Intergroup differences are shown in Table 2.

**Table 2.**

*Post-test intergroup comparison and effect size (data expressed as Mean  $\pm$  Standard Deviation).*

Variable	SEM Group (M $\pm$ SD)	Control group (M $\pm$ SD)	t	p	partial $\eta^2$	Cohen's d	Interpretation
Intrinsic motivation	4.01 $\pm$ 0.38	3.35 $\pm$ 0.42	4.85	<.001	0.26	1.20	Big effect
Technical-tactical performance	7.10 $\pm$ 0.81	5.60 $\pm$ 0.77	4.42	<.001	0.24	1.10	Big effect
Group cohesion	4.05 $\pm$ 0.50	3.40 $\pm$ 0.48	4.57	<.001	0.21	0.80	Medium-large effect

*Use.* Significant differences ( $p < .05$ ) show better results for the SEM group compared to the control.

Repeated measures ANOVA showed a significant interaction effect between the teaching model and the measurement time for all three variables (motivation:  $F_{\text{interaction}(1,58)} = 20.4$ ,  $p < 0.001$ ; technical-tactical performance:  $F_{\text{interaction}} = 18.7$ ,  $p < 0.001$ ; cohesion:  $F_{\text{interaction}} = 16.5$ ,  $p < 0.001$ ). This indicates that the evolution of scores from the pretest to the posttest differed between groups, confirming that the SEM group improved significantly more than the control group. The calculated effect sizes were large for motivation (Cohen's  $d \approx 1.2$ ) and technical-tactical performance ( $d \approx 1.1$ ), and medium for group cohesion ( $d \approx 0.8$ ), suggesting a significant magnitude of the benefits attributed to the SEM model, especially in motivation and game performance.

In summary, the SEM group significantly outperformed the control group in the improvements achieved. Students in the SEM group showed an average increase of 27% in their intrinsic motivation score (compared to 4% in the control group), 22% in their technical-tactical index (compared to 6%), and 26% in their level of group cohesion (compared to 7%), all of which were statistically significant ( $p < 0.01$ ). These quantitative results support the effectiveness of the Sport Education Model in enhancing motivation, playing skills, and group cohesion in university-level padel and pickleball instruction.

## Discussion

This study examined the application of the Sport Education Model (SEM) in university-level instruction of padel and pickleball, evaluating its effects on student motivation, technical-tactical learning, and group cohesion. In line with our hypothesis, the findings indicate that the implementation of the SEM produced significant improvements in all dimensions analyzed, compared to a traditional teaching approach. These results are then discussed in light of existing literature, and possible pedagogical and educational explanations are addressed.

**Student motivation:** Students who participated in the SEM model showed a notable increase in their intrinsic motivation for the activity, evidenced by higher enjoyment and interest scores in padel/pickleball classes. This result aligns with numerous previous studies that have documented the motivational effect of SEM. For example, Wallhead and Ntoumanis (2004) found that after a season with SEM, Physical Education students significantly increased their enjoyment and perceived effort in class, while groups with traditional teaching showed no positive changes in motivation. Similarly, Spittle and Byrne (2009) reported higher levels of intrinsic motivation and task orientation in students under SEM compared to a traditional control group, where a decrease in motivation was even observed at the end of the unit. In our study, the control group showed only a marginal (non-significant) improvement in motivation, suggesting that the traditional methodology—focused on teacher instruction and repetitive technical practice—was less effective in engaging students and sparking their interest in the activity. In contrast, the SEM environment, with its emphasis on real-world gameplay, active roles, and teamwork, seemed to generate a more engaging and relevant experience for students.

This result can be interpreted within the framework of Self-Determination Theory (Ryan & Deci, 2000). SEM satisfies basic psychological needs that promote self-determined motivation: it offers autonomy by allowing students to make decisions and assume varied roles, fosters competence by allowing them to perceive progress in actual game practice, and promotes relationships with others through teamwork. Several authors have shown that SEM nurtures these needs and increases intrinsic motivation (Perlman & Goc Karp, 2010; Wallhead & Ntoumanis, 2004). Furthermore, recent research in diverse contexts—from adolescents in Spain (Méndez-Giménez et al., 2022) to university students in other countries (Albaloul et al., 2024)—concur that SEM produces a robust motivational effect, offering students greater agency, enjoyment, and a sense of belonging within the class (Araújo et al., 2014; Chu & Zhang, 2022). Our results provide additional evidence of these benefits in the specific context of racket sports at the university level, an area that remains relatively unexplored. It is worth noting that the motivational increase occurred in just 8 weeks; a longer or repeated period in subsequent semesters could further consolidate motivation towards playing padel and pickleball, even encouraging continued participation in the activity during free time (Wallhead et al., 2014).

**Technical-tactical development:** Another important finding is that the SEM model led to greater improvements in students' technical skills and tactical knowledge compared to the traditional methodology. At first glance, it might be surprising that a model focused on play and competition is more effective for learning sports technique than conventional analytical repetition. However, our results reflect a trend also observed in the literature: learning in meaningful contexts and with a social structure can improve sports skills as much as—or even more than—classic directive practice.

In the SEM group, students had multiple opportunities to apply their skills in real game situations, receiving feedback from both the teacher and their peers (e.g., the captain coaching their team). This contextualized practice likely facilitated greater tactical transfer and understanding: students not only learned how to execute strokes, but also when and why to use them in developing a point. Furthermore, the extended season structure allowed for many repetitions of technical aspects within authentic matches, beyond what a traditional short unit typically offers. As Méndez-Giménez et al. (2022) point out, the continuity of the SEM model provides more practice opportunities, resulting in deeper skill development. Our results are consistent with those of Meroño et al. (2016), who found that a season with SEM improved swimmers' technical performance significantly more than a traditional cycle. Similarly, in

team sports contexts, research using hybrid models (SEM combined with other approaches) has reported improved decision-making and technical execution in small-sided games compared to directive methods (Mesquita et al., 2015; Pritchard et al., 2008). One possible explanation is that SEM does not simply allow students to passively "play," but rather the teacher structures situations, introduces pedagogical modifications when necessary (for example, adapting rules to emphasize a specific technical skill), and guides post-game reflections. This balance between intentional play and directed instruction could explain why the SEM group outperformed the control group: they obtained the best of both worlds (abundant practice in a real-world context and focused feedback). In contrast, the control group, despite practicing technically, lacked a real-world application context, and their sporadic matches proved insufficient to consolidate skills. Taken together, these findings reinforce the idea that playing to learn can be more effective than learning for the purpose of playing, provided there is an explicit pedagogical intention such as that provided by SEM.

**Group cohesion:** A novel contribution of this study is the evaluation of group cohesion in a racket sports environment, which are traditionally perceived as individual or doubles activities. The results showed that the Student Team Building (SEM) approach significantly increased class group cohesion compared to traditional teaching. This improvement was evidenced by perceptions of greater teamwork, camaraderie, and connection among the students in the experimental group. This finding was expected, given that team affiliation and cooperation are pillars of SEM. During the intervention, the students were part of the same team with a common goal (achieving the best performance during the season), shared successes and failures on the court, and had to communicate and support each other in their roles (for example, the student referee ensuring impartiality, teammates encouraging each other from the sidelines, etc.). These collaborative experiences tend to translate into a much stronger sense of unity and belonging than that which arises in traditional classes, where interactions are often sporadic and the social structure is not maintained from session to session.

Our data are consistent with previous studies: Jenkins and Alderman (2011) found that introducing SEM into university classes significantly increased task and social cohesion compared to a control group. Similarly, Kao (2019) observed significant improvements in several aspects of team cohesion (teamwork, adaptability, interpersonal relationships) in a course where SEM was implemented, while the group with direct instruction showed no changes. Furthermore, at the end of the SEM period, group

cohesion was significantly higher than in the control group, leading to the conclusion that SEM improves student cohesion and social skills. Cuevas et al. (2016) reported analogous findings: the SEM period promoted collaboration, communication, and a perception of fairness and mutual respect among group members.

Our work extends this knowledge to the context of padel and pickleball, demonstrating that it is possible to generate a strong sense of teamwork in typically doubles sports if they are organized as part of a team competition. In the control group, although students occasionally played doubles matches, no significant increase in cohesion was observed, probably because there was no continuity or long-term collective goals. This suggests that pedagogical design is key: simply including doubles games is not enough to generate cohesion, whereas structuring the class with permanent teams, clear roles, and shared objectives does have an impact on social dynamics. Greater group cohesion is not only beneficial in itself (improving the classroom climate), but it can also have positive indirect effects, such as increased attendance and effort. Students who feel part of a group tend to be more engaged in the activity and strive not to let their classmates down (Carron, 1988). In fact, cohesion is linked to motivation: studies have suggested that social cohesion can increase motivation by satisfying the need for belonging (Bruner et al., 2017). In our case, it is plausible that the greater cohesion achieved with SEM has also contributed to the observed increase in motivation, creating a virtuous cycle between feeling part of a team and enjoying the activity.

**Practical implications:** The results of this study have clear implications for teaching racket sports in university settings (and can be extrapolated to other educational levels). First, they demonstrate that the Sport Education Model (SEM) is a highly effective pedagogical alternative for engaging students and enhancing both their technical learning and their personal and social development. In subjects where the objective is not to train elite athletes but to educate through sport, the SEM offers a structure that balances the teaching of content (skills, rules, tactics) with the development of transversal skills (teamwork, leadership, responsibility). For recreational sports such as padel and pickleball, which are increasingly popular among young people, applying the SEM can further increase their appeal in the classroom, transforming the class into an experience similar to a small university tournament. The improvements in motivation suggest that students using the SEM may be more inclined to continue practicing these sports outside the academic environment, contributing to the adoption of active lifestyles. Furthermore, the greater group cohesion indicates that this model can be

useful in first-year university contexts or in integration programs, where the aim is to strengthen camaraderie and collaboration among students.

For example, in the initial training of future physical education teachers, implementing the SEM (Sports Evaluation Method) not only teaches sports content but also models a methodology that students can later replicate in their professional practice, thus generating a double educational benefit. From the teachers' perspective, implementing the SEM in racket sports requires careful planning (season design, role assignment, preparation of materials for recording results, etc.), but the observed benefits justify this effort. It is important for the teacher to facilitate students' assumption of roles, providing support especially at the beginning (for example, teaching them how to referee or act as captain) so that the experience is positive. Likewise, an inclusive environment should be promoted where competition serves as motivation and does not exclude anyone; in our study, both aspects were balanced by integrating rules *offair play* by distributing responsibilities and equalizing playing opportunities (as recommended by Hastie et al., 2011). In short, university educators have evidence to consider SEM as a valuable teaching strategy in racket sports such as padel and pickleball, combining high participation, meaningful learning, and social cohesion in the classroom.

Along these lines, several recent studies have explored the effectiveness of innovative pedagogical models in Physical Education, particularly highlighting the combination of the Sport Education Model with other methodological approaches. Thus, hybridization with models such as cooperative learning or Teaching Games for Understanding has been shown to enhance both technical learning and tactical understanding of the game (Javier Fernández-Río & Ángel Méndez-Giménez, 2011; Shane Harvey et al., 2020). In this sense, cooperative learning is consolidating itself as a key pedagogical model in Physical Education due to its capacity to improve social interaction, shared responsibility, and student engagement (Fernández-Río & Méndez-Giménez, 2016). Furthermore, recent literature continues to demonstrate the benefits of the Sport Education Model not only in motivational and performance variables, but also in promoting healthy lifestyles in university settings (Liao et al., 2023) and improving attitudes toward learning in Physical Education (Zhang et al., 2024). Regarding racket sports, current research highlights the potential of pickleball as an innovative teaching resource due to its accessibility and inclusive nature within the curriculum (Barranca-Martínez et al., 2023; Ho, 2025).

Furthermore, the growing scientific interest in racket sports is also reflected in bibliometric studies analyzing emerging trends such as the relationship

between emotional intelligence and athletic performance (Ortega-Caballero & Alcalá-Ríos, 2025), reinforcing the need for continued research from multidisciplinary perspectives. Taken together, these contributions support the integration of active pedagogical models and emerging sports as an effective way to innovate in physical education teaching, fostering more meaningful, inclusive learning that is adapted to the current needs of students.

### **Limitations and future research**

Although this study provides relevant findings, several limitations should be noted. First, the quasi-experimental design (intact groups) and the moderate sample size (two classes, 60 students) warrant caution when generalizing the results. While baseline variables were controlled and both groups were equivalent at the beginning, uncontrolled factors—for example, pre-existing differences in motor skills, attitudes, or the relationship with the teacher—could have influenced the results. Future research should expand the sample to include multiple control and experimental groups at different universities, and even randomly assign students to each condition when possible, to strengthen the study's internal validity.

Secondly, the measures used to assess technical-tactical learning, while adequate for this study, could be improved in future work. A combined index of technical performance and tactical knowledge was used, but it would be desirable to incorporate more specific and validated assessments. For example, future studies could use instruments such as the *Game Performance Assessment Instrument* (GPAI) to analyze tactics in real game situations, or to apply standardized technical tests specific to padel and pickleball, which would improve the accuracy of motor learning measurements. Furthermore, this study focused on quantitative measurements; it would be useful to complement it with qualitative methods to gain a deeper understanding of the students' experience. Interviews or focus groups with students about their perception of learning under SEM versus traditional methods could provide information on why the model impacts motivation and cohesion from the participants' own perspective.

Furthermore, another area of interest would be to explore the long-term follow-up of the observed effects. For example, it would be valuable to investigate whether the elevated motivation persists for weeks or months after the unit ends, or whether students continue playing padel and pickleball on their own initiative in university recreational programs. Such follow-up assessments could clarify the durability of the SEM effects on attitudes and behaviors toward physical activity. Finally, since this study addressed padel and pickleball together as part of the same design, future studies could analyze each sport separately. This would allow

researchers to determine whether the impact of SEM is consistent across both sports or whether one benefits more than the other, possibly due to its specific characteristics (for example, pickleball, being a relatively new sport, might generate different levels of motivation than the more established padel).

## Conclusions

The implementation of the Sport Education Model (SEM) in university-level padel and pickleball instruction produced significant positive effects on student motivation, technical and tactical development, and group cohesion, compared to a traditional approach. SEM proved to be an effective pedagogical strategy for actively engaging students in the learning process by recreating an authentic sporting experience in the classroom. Students using SEM not only learned to play better—improving their skills and understanding of the game—but also enjoyed learning more and felt more united as a group, demonstrating the holistic nature of this model, which addresses motor, cognitive, and socio-affective objectives. These findings support the feasibility of incorporating SEM into higher-level Physical Education programs or university sports courses, especially for participatory sports like padel and pickleball, which benefit from a cooperative and playful approach.

In light of the evidence presented, teachers and curriculum developers are encouraged to consider adopting the Sport Education Model when the goal is to foster committed and sustained participation of young people in physical activity. In the field of racket sports, the SEM offers a structured framework for teaching not only technique but also values such as teamwork, sportsmanship, and independent learning. By placing the student at the center—giving them roles, a voice, and responsibility—this model facilitates meaningful learning that extends beyond the classroom: students develop a more positive connection with the sport and with their peers, which can translate into greater well-being and a stronger sporting habit. Ultimately, the Sport Education Model is presented as an ideal pedagogical innovation for teaching padel, pickleball, and other sports at the university level, promoting high-quality physical education focused both on mastering the sport and on the student's holistic development.

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