



## Preservice Physical Education teachers' learning experience with a game-based approach based on nonlinear pedagogy

*Experiencia de aprendizaje de profesores de Educación Física en formación con el game-based approach basado en la pedagogía no lineal*

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### Abstract

**Objective:** The aim of this study was to examine the impact of a game-based approach based on nonlinear pedagogy on the perceived learning experience of preservice teachers.

**Methodology:** A total of 25 preservice teachers underwent a soccer teaching unit of 32 lessons (16 theoretical and 16 practical). Theoretical lessons were based on formal instructions, whereas practical lessons were delivered using the Oslin and Mitchell (2006) structure for invasion games teaching and by developing representative task design workshops. After the unit, preservice teachers completed a survey to provide insights into their perceptions of their learning experience. They were asked about six key components of a game-based approach unit, their perceptions of their skills, game understanding and enjoyment, and the use of game-based approach and non-linear methods, as well as its possibilities.

**Results:** Results showed positive perceptions among participants among the participants regarding their perceived learning experience. Participants who had experience in soccer scored significantly higher on the importance of technical skills in the game performance. In addition, participants scored significantly higher after their participation in the unit in their perceptions about of their skills and game understanding.

**Discussion:** Findings suggest that the game-based approach based on nonlinear pedagogy provided a positive perceived learning experience for the participants.

**Conclusions:** This approach, based on nonlinear pedagogy, could be useful in teacher preparation in the physical education context.

### Keywords

Games teaching; nonlinear pedagogy; physical education; teacher education.

### Resumen

**Objetivo:** El objetivo de este estudio fue examinar el impacto de una unidad game-based approach basada en la Pedagogía No Lineal sobre la experiencia percibida de aprendizaje de los profesoredocentes en formación.

**Metodología:** Un total de 25 profesores en formación participaron en una unidad didáctica de fútbol de 32 clases (16 teóricas y 16 prácticas). Las clases teóricas se basaron en instrucciones formales, mientras que las clases prácticas se impartieron utilizando la estructura de Oslin y Mitchell (2006) para la enseñanza de juegos de invasión y desarrollando talleres de diseño de tareas representativas. Después de la unidad, los profesores en formación completaron una encuesta para proporcionar información sobre su percepción de la experiencia de aprendizaje. Se les preguntó sobre seis de los componentes clave de una unidad basada en el game-based approach, su percepción de sus habilidades, su comprensión y disfrute del juego, y el uso del game-based approach y los métodos no lineales, así como sus posibilidades.

**Resultados:** Los resultados mostraron una percepción positiva de los participantes sobre su experiencia de aprendizaje. Los participantes que tenían experiencia en fútbol obtuvieron puntuaciones significativamente más altas en la importancia de las habilidades técnicas dentro del rendimiento del juego. Además, los participantes obtuvieron puntuaciones significativamente más altas después de su participación en la unidad en las percepciones sobre sus habilidades y comprensión del juego.

**Discusión:** Los hallazgos sugieren que el game-based approach basado en la Pedagogía No Lineal proporcionó una experiencia de aprendizaje positiva a los participantes.

**Conclusiones:** Se concluye que este enfoque, basado en la Pedagogía No Lineal, podría ser útil en la formación de los profesores en el contexto de la educación física.

### Palabras clave

Enseñanza de juegos, pedagogía no lineal, educación física, formación del profesorado.

## Introduction

Games such as soccer are characterized by specific dynamics that emerge during the game as a consequence of the relationships between teammates, opponents, ball position, and contextual factors (e.g., score status, competitiveness, tactical strategies) (Folgado et al., 2018). Practitioners (e.g., teachers and coaches) play a critical role, as the skill acquisition process helps players understand game dynamics and adapt their actions to competitive game situations. Thus, the way the game is taught requires practical situations in which players are able to adjust behaviors according to the changing dynamics of the game (Gréhaigne et al., 1997; Gréhaigne et al., 2011; González-Artetxe et al., 2022; Low et al., 2020).

The relevance and importance of players' understanding of the dynamics of the game and their ability to adjust their tactical behavior to diverse contexts in the game have implications for the kind of pedagogical approaches to be adopted to enhance learning (Chow et al., 2006; Serra-Olivares et al., 2015; Momparler & Guzmán, 2024). Traditionally, practitioners tend to use activities that focus on repetitions to achieve a consistent movement form for successful performance. Such linear pedagogical approaches are based on task decomposition to allow learners to first learn parts of a skill or game before moving on to gameplay (Light & Tan, 2006; Bergmann et al., 2021). However, such approaches lack representativeness and may limit transfer of learning, and the effectiveness of applying those skills in real game contexts is unclear (Chow et al., 2016).

In contrast, game-based approach based on nonlinear pedagogical principles (GBA), underpinned by the specific dynamics and properties of the game, with an emphasis on teaching game skills within conditioned game situations, preserve the integrity of the game (Serra-Olivares et al., 2015; Jarrett & Light, 2018; Serra-Olivares et al., 2016a; Kinnerk et al., 2021). Thus, GBA highlights the importance of knowing the effects of modifications on tactical constraints and the tactical complexity/technical difficulty involved in developing behaviors (Serra-Olivares et al., 2016b; Machado et al., 2020). In addition, GBA encourages task simplification, allowing greater success with a focus on individual differences. This practical approach occurs within the context of conditioned games and typically has a higher level of representativeness than traditional teaching approaches. Proper use of the GBA may improve the effectiveness of the game teaching-learning process (Chow et al., 2016; Breed et al., 2024). Four key pedagogical principles have been proposed for the teaching process in GBA: a) sampling, b) tactical complexity, c) representation, and d) exaggeration (Tan et al., 2011). From a pedagogical point of view, these principles are related to the teacher/coach's capacity to adjust the teaching process to meet the learner's skills and needs (Serra-Olivares et al., 2016b; Cantos & Moreno, 2019).

In the same way, relevant GBA methodological strategies are suggested: (1) the importance of developing the "What to do" and "How to do" skills of tactical knowledge and game performance; (2) the suggestion of planning the lessons using a Global-Analytical-Global structure (e.g., focusing the first and the last part of the lesson on the "What to do" skills and the middle part of the lesson on the "How to do" skills by changing the task constraints of the game); (3) the use of the constraint-led approach to motor learning to adapt the task to the learners' needs; (4) the use of the "Freezing" strategies for helping the learners explore and identify the key aspects of the game; and (5) the use of "Questioning" strategies to be aware, as a teacher/coach, about how to adapt the teaching process to the learners (Oslin & Mitchell, 2006; Tan et al., 2011; Hopper, 2011; Richardson et al., 2013).

The evidence reviewed above supports the effectiveness of GBA in teaching invasion games (Machado et al., 2020; Harvey et al., 2010; Práxedes et al., 2018; Naira-Navarrete et al., 2024). In the context of teacher education, GBA may contribute to increased self-determination and intrinsic motivation of pre-service teachers (Moy et al., 2015). Thus, adopting GBA underpinned by the pedagogical principles of nonlinear pedagogy can provide participants with opportunities to experience success in situations that match their action capabilities. It enhances learners' perceptions of autonomy and competence (Renshaw et al., 2019; Kinnerk et al., 2018). It has been suggested that such approaches allow learning to occur implicitly through exploratory processes supported by the teacher (Barquero-Ruiz & Kirk, 2023; Renshaw et al., 2019). In addition, the process of shared responsibility enhances teacher and student perceptions of relatedness (Renshaw et al., 2012).

Harvey & Jarrett (2013) and Richardson et al. (2024) reviewed studies that adopted GBA lessons. Some studies have reported that preservice teachers view GBA as a viable pedagogical model that can contrib-

ute to the cognitive development of pupils and allow them to have fun. They were likely to use the approach in the future due to the perceived benefits related to the enhancement of student engagement, tactical development, and inclusivity. The presence of effective support is a key factor that encourages preservice teachers to continue using GBA. The presence of a community of practice helps them develop and strengthen their conceptual understanding of GBA, communication skills, and self-confidence. Preservice teachers perceive positive affective development related to their learning experiences with the use of GBA (Light & Tan, 2006; Light & Georgakis, 2007; McNeill et al., 2008).

Furthermore, Parkes and Hemphill (2025) and O'Leary (2016) in the United States and the United Kingdom, respectively, demonstrate how preservice teachers' perceptions of GBA are influenced by their prior sports experiences, coaches they have had, and peer teaching, asserting that it is possible to move beyond traditional teaching approaches and learn to use GBAs in optimal learning environments with adequate learning time.

Against this backdrop, recent systematic reviews have demonstrated the scientific evolution of GBA over the past decades (Galeano-Rojas et al., 2023; Richardson et al., 2024). Most of this evidence comes from European, Asian, and North American sociocultural contexts, with little or no evidence from Latin America (Barba-Martin et al., 2020). Given the lack of studies in Latin America, assessing the perceptions of preservice teachers regarding the effectiveness of GBA in the Chilean educational landscape is particularly important. It seems that GBA may connect well with the need for a change in the National Quality Measurement System (Rodríguez, 2016) and the current adaptations of the Chilean curriculum for physical education (PE) in elementary and secondary schools. This postulate is reinforced in the mention and use of sport in the curriculum in its three axes: motor skills, active living and health and safety, fair play, and leadership (MINEDUC, 2022; MINEDUC, 2015). Teachers' perceptions have been examined in studies using similar PE methodologies, which may help strengthen the pedagogical potential of GBA (James et al., 2015; Ko et al., 2006; García-Castejón et al., 2021).

Thus, the purpose of this study was twofold: (i) to assess the perceptions of a group of Chilean preservice teachers about GBA after their participation in a soccer GBA teaching unit; (ii) to examine differences in participants' perceptions according to their previous soccer experience and changes in self-perceived skills, game understanding, and enjoyment after the intervention.

## Method

### Participants

The study used convenience sampling and included 25 Chilean preservice teachers ( $n = 25$ : 18 men and 7 women; age:  $22.06 \pm 1.43$  years) from a university in the Araucanía Region. During this study, the preservice teachers were enrolled in a soccer coaching course as part of their third year of the Physical Education Teaching program. The participants were organized into their own class and had no prior experience with the GBA. All participants were informed about the study's requirements and procedures, as well as the risks and benefits of participating. The eligibility criteria were as follows: being enrolled in the current soccer course, signing the informed consent form, attending at least 90% of the sessions, and properly completing the measurement instrument. All study procedures complied with the Declaration of Helsinki (World Medical Association, 2013). The Research Ethics Committee of the University of Granada approved the project (code 4558/CEIH/2024).

### Procedure

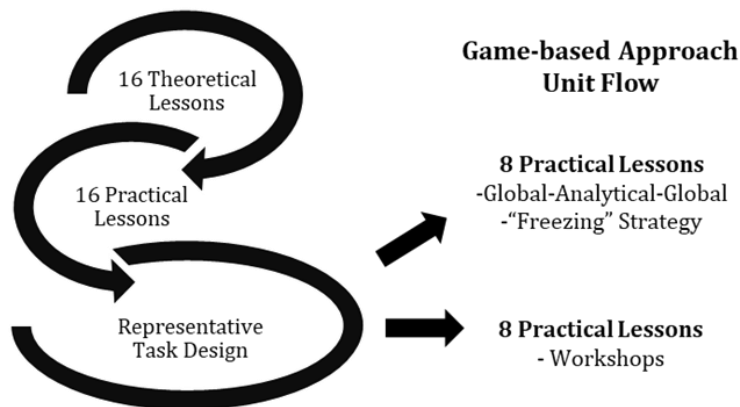
#### *Intervention design and fidelity*

During the second semester of the 2024 academic year, all participants completed a GBA teaching unit in the subject "Soccer Teaching". The unit was designed by one of the authors of this study, who has more than eight years of experience in teacher education and in the development of similar PE methodologies. The unit was also adapted by the authors of the study to fit the principles of previous GBA teaching units (Oslin & Mitchell, 2006; Tan et al., 2011). In addition, the design of the unit was supervised by two experts, one expert in nonlinear pedagogy and the other in GBA. Both experts had previously developed similar projects and published more than 30 scientific studies in the field. In this regard, the



teacher who implemented the teaching unit at the school had six monthly videoconference meetings with the experts to ensure the fidelity of the implementation. In those meetings, three aspects were discussed: (a) monitoring the progress of the students; (b) analyzing the possibility of adding or removing learning tasks for the lessons; and (c) emerging situations that occurred in the classes. Finally, an instructional checklist regarding the model's characteristics and its application was used to ensure the program's reliability, confirming that all checklist items were present (100%) (Hastie & Casey, 2014).

Figure 1. Game-based approach teaching units



### *Implementation of the intervention*

All bibliographical materials were provided to the participants. The contents of the teaching unit were organized in blocks, coinciding with the same themes and topics that were designed to be developed in the subject "Soccer Teaching": (1) Dynamical systems and ecological psychology theories, (2) nonlinear pedagogy and game-based approach principles, (3) representative task design, (4) soccer rules, (5) Invasion games teaching: Tactical problems, (6) Soccer Technical-Tactical skills, (7) tactical, declarative, and procedural knowledge, and (8) game performance assessment. The unit lasted 32 lessons (16 theoretical and 16 practical) (Figure 1). Each week, one theoretical and one practical lesson was developed. The theoretical lessons lasted two hours, whereas the practical lessons lasted one hour and thirty minutes. The teacher who implemented the unit was the same teacher of the "Soccer Teaching" subject and one of the study's authors.

Theoretical lessons were based on formal instruction using bibliographic materials and PowerPoint slides. In the case of practical lessons, eight were delivered by the teacher using the Global-Analytical-Global structure of the GBA and the game "freezing" strategy: game practice, tactical awareness, decision-making, technical skills practice, and the initial game or a new modified game practice. This structure was used to follow the NLP coaching principles of: mutuality between the performer and the environment, coupling of perception and action, self-organization under constraints, nonlinear processes in performance, and a focus on the learner (Renshaw et al., 2019).

After every practical lesson, a reflection and discussion period was conducted with all participants and the teacher. The other eight practical lessons were representative task design workshops. All theoretical and practical lessons were designed and performed using the "Questioning" strategies to stimulate the participants' critical thinking (Gaspar et al., 2021).

In parallel with the theoretical classes, every two weeks since the second theme block, participants were organized in groups of four and asked to design and perform workshops related to the practical content of Representative Task Design, following the coaching principles of NLP: practice variability, team as a dynamical system, balance between stability and instability, co-adaptive moves, creativity in learning and performance, implicit learning, and type of practice to be used (blocked vs. random) (Renshaw et al., 2019).

For example, for one week, the preservice teachers were asked to design and perform two modified games in groups, as “teachers/coaches.” The games were designed around the tactical problem of attacking the goal, focusing on the development of passing skills within representative game contexts and considering the previously describes NLP principles. Thus, the participants completed eight workshops on the representative task design topic. At the end of the course, the participants were asked to complete a survey about their teaching experience.

### *Instrument*

A survey on the participants’ perceptions about their experience with the GBA unit was designed. The survey used in this study was an ad hoc instrument adapted from the PE Season Survey originally developed by Mohr et al. (2003), later refined by Hastie and Sinelnikov (2006), and subsequently employed in similar research contexts (e.g., Gutiérrez Díaz del Campo et al., 2014). The instrument was translated into Spanish following Vallerand’s (1989) guidelines for cross-cultural adaptation, including forward and backward translation procedures carried out by bilingual experts.

The initial version of the questionnaire was reviewed by a panel of five experts in PE pedagogy and GBA to ensure content validity, who evaluated the clarity, relevance, and representativeness of each item. Minor modifications were made based on their feedback to improve wording and contextual appropriateness.

The final version of the questionnaire comprised 18 items organized into three sections. The first section (Q1–Q6) assessed participants’ perceptions of key components of the GBA unit, including the game’s importance, tactical understanding, tactical knowledge, perception and decision-making, technical development, and overall decision-making processes. Responses were recorded using a five-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree).

The second section (Q7–Q12) focused on participants’ self-perceptions of their skills, game understanding, and enjoyment in soccer, both before and after their participation in the GBA unit. These items were rated on a scale of 1 (very poor) to 10 (excellent).

The third section (Q13–Q17) explored students’ perceptions of the implementation of GBA and nonlinear pedagogical principles, including teaching structure, task representativeness, constraint manipulation, and instructional strategies such as questioning, freezing, and group discussion. The final item (Q18) assessed participants’ overall evaluation of this approach’s pedagogical potential. Items in this section were rated on a scale from 1 (none) to 10 (a lot).

Internal consistency analyses showed acceptable values for all sections of the instrument (Cronbach’s alpha = .82 for Section 1, .86 for Section 2, and .79 for Section 3), indicating satisfactory reliability. Table 1 presents the completed questionnaire.

### **Data analysis**

The results were organized according to the soccer experience of the participants (Experienced: prior experience in competitive clubs; Inexperienced: never registered with a soccer federation). SPSS 28.0 software was used. The means and standard deviations of all survey items were calculated. Subsequently, the normality of the data was assessed, and parametric tests were selected ( $p > 0.05$ ). A one-way ANOVA was conducted for the third section of the survey to analyze possible differences in participants’ perceptions of six key components of a GBA unit based on their soccer experience (P1–P6). Similarly, a one-way analysis of variance was conducted to analyze possible differences in participants’ perceptions regarding the use of GBA teaching methodologies and the final evaluation of the unit’s teaching potential (P13–P18). Finally, to determine differences in participants’ perceptions from the beginning to the end of the unit, a pre-post repeated-measures t-test with Bonferroni correction was performed for each item in the second section (P7–P8; P9–P10; P11–P12). The effect size (ES) was calculated using Cohen’s  $d$  for standardized difference tests, according to the following interpretation:  $<0.2$  = trivial;  $0.2$ – $0.6$  = small;  $0.6$ – $1.2$  = moderate;  $>1.2$  = large (Batterham & Hopkins, 2006) and eta-squared ( $\eta^2$ ) in the ANOVA models according to the following cut-offs: small effect 0.01, medium effect 0.06, and large effect 0.14 (Richardson, 2011). The level of statistical significance was set at  $p < .05$ .



Table 1. Game-based approach teaching unit survey

Game-based approach teaching unit survey	
1.	I liked that the foundation of this course was focused on the game.
2.	I liked that the course was organized based on the appreciation of the game (theoretically and practically).
3.	I liked that the course was oriented to soccer teaching based on "tactical knowledge".
4.	I liked that the course was oriented toward representative task design focused on decision-making skills: To develop the "What" and "How to do" skills.
5.	I liked that the methodologies that we saw in the course included technical skills as an important part of skill development.
6.	I liked that the methodologies that we saw in the course included decision-making and technical skills as part of game performance.
7.	Rate your soccer skills BEFORE starting the course from 1 (very bad) to 10 (excellent).
8.	Now, (from 1 to 10), rate your soccer skills AFTER finishing the course.
9.	Rate your understanding of how to play soccer BEFORE the course.
10.	Rate your understanding of how to play soccer AFTER the course.
11.	From 1 to 10, indicate how much you liked soccer BEFORE experiencing the unit.
12.	From 1 to 10, indicate how much you like soccer AFTER having experienced the unit, considering the modified games, the organization of the lessons, the freezing and questioning strategies, etc.
13.	From 1 (a little) to 10 (a lot), indicate to what extent you agree that soccer teaching should be organized around the principles of SAMPLING, GAME MODIFICATION, and TACTICAL COMPLEXITY.
14.	From 1 (a little) to 10 (a lot), indicate to what extent you agree that soccer teaching should be organized using the GLOBAL-ANALYTIC-GLOBAL LESSON structure.
15.	From 1 (a little) to 10 (a lot), indicate to what extent you agree that soccer teaching should be based on the GAME MODIFICATION BY PRINCIPLES OF REPRESENTATION AND EXAGGERATION.
16.	From 1 (a little) to 10 (a lot), indicate to what extent you agree that soccer teaching should be based on THE MODIFICATION / AWARE OF THE INDIVIDUAL, TASK, and CONTEXT OF CONSTRAINT OF MOTOR LEARNING.
17.	From 1 (a little) to 10 (a lot), indicate to what extent you agree that soccer teaching should use THE FREEZING AND QUESTIONING (ABOUT TECHNICAL AND TACTICAL ASPECTS) STRATEGIES.
18.	From 1 (a little) to 10 (a lot), indicate how much you think soccer teaching using these methodologies and strategies would be effective.

## Results

### *Perceptions of participants about the key game-based approach components used in the unit*

The data analysis showed positive perceptions among participants regarding the GBA unit, with around four points in all components. In addition, differences in the participants' perceptions about the key components of a GBA unit depending on soccer experience were observed (Table 2). However, only significant differences were found regarding the importance of technical skills within game performance behaviors. In this sense, participants who had soccer experience scored significantly higher on this component (Table 3).

Table 2. Participants' perceptions about the key components of a game-based approach unit

	Experience			
	Experienced		No experienced	
	M	SD	M	SD
Game importance	4.08	.76	4.08	.51
Tact. understanding	4.38	.65	4.08	.79
Tactical knowledge	3.62	.96	3.92	1.00
Perception-Decision	4.46	.52	4.08	.79
Technical skills	4.69	.48	4.00	.74
Decision-making	4.00	1.08	4.17	.58

Table 3. Participants' perceptions differences about the key components of a game-based approach unit, depending on experience

	Experience
Game importance	$p = .981$ ; $F = 0.01$ ; $\eta^2 = .000$
Tact. understanding	$p = .308$ ; $F = 1.07$ ; $\eta^2 = .566$
Tactical knowledge	$p = .449$ ; $F = 0.59$ ; $\eta^2 = .566$
Perception-Decision	$p = .168$ ; $F = 2.05$ ; $\eta^2 = .893$
Technical skills	$p = .010$ ; $F = 7.88$ ; $\eta^2 = .299$
Decision-making	$p = .639$ ; $F = 0.23$ ; $\eta^2 = .173$

### *Participants' perceptions of their soccer skills, game understanding, and enjoyment after participating in the game-based unit*

Table 4 shows the positive perceptions of the participants about their soccer skills, game understanding, and enjoyment after participating in the GBA unit. In this sense, participants scored significantly higher



in the perceptions about their skills and game understanding after participating in the GBA unit. However, no significant differences were observed in the perceptions of the enjoyment of playing soccer.

Table 4. Participants' perceptions of their skills, game understanding and enjoyment pre and post their experience

Perceptions	Pre-unit	Post-unit	t	p	d
Skills	6.16 (2.13)	7.88 (1.45)	-6.577	< .001	0.94 moderate effect
Game understanding	6.45 (2.10)	8.37 (1.20)	-6.027	< .001	1.12 moderate effect
Enjoyment	7.72 (2.66)	8.04 (2.28)	-1.218	.235	0.13 trivial effect

### **Perceptions of participants about the game-based approach teaching methodology**

Results show positive perceptions of the participants about the use of GBA based on non-linear pedagogy teaching strategies, over seven points in all modules asked: pedagogical principles, class structure, representative task design strategies, motor learning and constraints, and freezing and questioning methodologies (Table 5). Nevertheless, differences were not significant when sex and soccer experience were used for analysis (Table 6).

Table 5. Participants' perceptions about the use of game-based and non-linear pedagogies teaching methods

	Experience			
	Experienced		No experienced	
	M	SD	M	SD
Pedagogical principles	7.85	1.41	8.00	1.86
Class structure	7.85	2.15	8.17	1.59
Representative task design	8.15	1.46	7.58	1.88
Motor learning and constraints	7.92	1.75	7.50	1.68
Freezing, questioning and group sharing	7.6	2.1	8.3	1.7
Teaching possibilities	7.38	2.47	7.67	2.19

Table 6. Participants' perceptions differences about the use of game-based and non-linear pedagogies teaching methods, depending on sex and experience

	Experience
Pedagogical principles	p = .817; F = 0.05; $\eta^2$ = .055
Class structure	p = .678; F = 0.17; $\eta^2$ = .641
Representative task design	p = .404; F = 0.72; $\eta^2$ = .031
Motor learning and constraints	p = .545; F = 0.37; $\eta^2$ = .117
Freezing, questioning and group sharing	p = .419; F = 0.68; $\eta^2$ = .513
Teaching possibilities	p = .766; F = 0.09; $\eta^2$ = .496

## **Discussion**

This study aimed to examine the perceptions of a group of Chilean preservice teachers after their participation in a soccer game-based approach teaching unit, within the course Soccer Teaching, during their third year of the Pedagogy in PE degree. Among the main results, the study participants expressed a positive perception of most of the components of the GBA unit, and experienced students obtained significantly higher scores in this regard.

The results of this study are in line with previous findings, which indicate that learning situations with this type of methodology are often associated with high levels of satisfaction and motivation of preservice teachers (McNeill et al., 2008; Moy et al., 2019; Light & Tan, 2006; Moy et al., 2015; Light & Georgakis, 2007). In addition, recent reports indicate that individuals with more sports experience show higher participation in activities that use GBA (Nathan et al., 2018; García-Ceberino et al., 2020), since they achieve improvements in individual and collective performance, besides promoting the subjects' personal and social development (Kinnerk et al., 2018; Miller et al., 2017).

Similarly, studies conducted with PE preservice teachers observed similar results to the present report (Moy et al., 2015; Moy et al., 2019). The literature suggests that these teaching programs favor positive attitudes toward learning and increase the participation of PE students (Bracco et al., 2019; Gil-Arias et al., 2018; Galeano-Rojas et al., 2023). However, it is common for students to face different dilemmas

when they stop using traditional models because they are more familiar with traditional approaches of teaching games (Harvey et al., 2014; Moy & Rossi, 2024).

In this study, the participants obtained significantly higher scores in their perceptions of their skills and game understanding after completing the GBA unit. The evidence suggests that nonlinear game-based teaching strategies may contribute to participants' perceptions of improved knowledge, decision-making, and game skills. According to previous studies, it is suggested that PE preservice teachers could experience an increase in their perception of their playing skills when they participate in this type of methodology, feeling more competent in their performances (Richardson et al., 2024; Moy et al., 2019). In this regard, the use of nonlinear pedagogy principles within similar teaching units has been previously suggested as an efficient teaching strategy to help beginners improve decision-making abilities and game understanding through adaptive learning processes (Breed et al., 2024; Cantos & Moreno, 2019; Miller et al., 2017).

The incorporation of non-linear pedagogy principles into the design of teaching games programs is advisable. The process involves manipulating key task constraints on learners to facilitate the emergence of functional movement patterns and decision-making behaviors. In this context, preservice teachers can design representative tasks to expose learners to many functional and creative performance solutions during training. Therefore, they must shift from a more traditional and prescriptive stance to a holistic, dynamic, and complex perspective, where the interaction between environment, student, and task facilitates the emergence of sports-related behaviors and learning in the PE curriculum (Chow et al., 2016; Chow & Atencio, 2012; Renshaw & Chow, 2018). This implies that faculty responsible for training future teachers should focus on areas such as recruiting teaching-oriented staff, emphasizing the model's origins in sport, contrasting TGfU with traditional pedagogies, debunking the notion that TGfU and fundamental pedagogies are opposites, providing a gradual series of early field experiences, teaching within small-sided games, and identifying tactical problems (Castro and Morgan, 2025).

Continuing with the analysis of perceptions, the participants of this study did not show significant changes in their enjoyment of soccer after the GBA unit. These results could be related to the fact that a high number of individuals who participated in this study had previous experiences in soccer. The current findings differ from previous studies in which it was observed that students increase their enjoyment levels when performing similar teaching units (Kinnerk et al., 2018), especially in PE (García-Castejón et al., 2021; Buendía et al., 2021).

In the same line, according to Chow et al. (2016), this type of approach allows the creation of individualized and challenging learning environments at different developmental levels. The use of games teaching units based on GBA and non-linear pedagogy foundations is growing (Barquero-Ruiz & Kirk, 2023; Chow & Atencio, 2012). This is due to the fact that GBA based on non-linear pedagogy foundations is focused on the learner, promoting less structured teaching situations and leading learners to develop self-discovery, so that students can improve their learning autonomy and become more competent (Renshaw & Chow, 2018; Lee et al., 2017). Additionally, these methodologies could lead to designing attractive and motivating learning contexts for PE preservice teachers (Moy et al., 2015; Moy et al., 2019). This interpretation is consistent with the results of the present study, in which students reported being able to design individual and collective learning situations that integrate the cognitive, social, emotional, and physical domains. These processes have been shown to be effective in providing preservice teachers with the opportunity to acquire effective and contextualized professional skills (Breed et al., 2024; Richardson et al., 2024; Galeano-Rojas et al., 2024).

In this regard, the scarcity of similar initiatives in PE at the international level should be noted. Although the principles of GBA and non-linear pedagogy foundations are in line with the national curriculums for PE Elementary and Secondary School (i.e., in Chile) (MINEDUC, 2022; MINEDUC, 2015), recent review studies do not report on published experiences in this regard at the Latin American level (Galeano-Rojas, 2023; Barba-Martin et al., 2020; Richardson et al., 2024). In addition, many countries' national standards for PE teacher training establish that programs should focus on knowledge, skills, and attitudes that are oriented toward the purposes of the subject of PE (Harvey & Jarrett, 2013). Therefore, it could be interesting to develop similar teaching units to improve the professional training of PE preservice teachers. These findings are aligned with the Chilean PE curriculum, where the need to use sport as an educational resource is expressed, which allows the development of three axes: (1) motor skills, (2) active living and



health and safety, and (3) fair play and leadership (MINEDUC, 2022; MINEDUC, 2015). Therefore, the experience presented in this study contributed to the teacher training of the participants.

### **Limitations and Prospects**

This study has several limitations. First, the convenience sampling method does not allow for the generalization of the results. Additionally, there was no control group against which to compare the program's findings. It would also be noted that the measurement instrument assesses perceptions; in this regard, employing other types of instruments (observational, etc.) to measure gameplay performance would be useful. In this regard, it would be interesting to examine the perceptions of the preservice teachers participating in this study through qualitative interviews and to analyze the potential of GBA teaching units in the professional development of future Chilean PE teachers. Furthermore, implementing the program in other sociocultural contexts and through the teaching of other ball sports would help expand the evidence regarding its effectiveness with preservice teachers across Latin America.

### **Conclusions**

The results showed that, after the GBA experience, preservice teachers assigned greater value to technical skills than before. No other significant differences were found in the participants' perceptions of the key components of GBA. Considering the pre- and post-comparisons regarding the experience in GBA, participants' perceptions about skills and game understanding moderately improved, while enjoyment remained similar between pre- and post-program. Finally, no significant differences were found in the perceptions regarding the use of the GBA unit depending on participants' soccer experience. In conclusion, similar GBA units may benefit preservice teachers by improving their perceptions about their skills and game understanding. Thus, it could help increase their self-confidence to design their own GBA units in the future during PE classes or sports teaching.

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