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Evaluating FunEBall in physical education: an explanatory sequential mixed-methods study

Evaluación de FunEBall en educación física: un estudio de métodos mixtos secuencial explicativo

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Abstract

FunEBall is an inclusive net-based team sport designed to promote cooperation, active participation, and enjoyment. This study evaluated its implementation in university physical education using an explanatory sequential mixed-methods design. In the quantitative phase, 60 students from a state university in Davao Oriental, Philippines, were selected through purposive sampling. Data were collected using the researcher-developed FunEBall Student Feedback Survey and analyzed using descriptive statistics, independent-samples t-tests, ANOVA, Tukey's HSD test, supplementary nonparametric analyses (Mann–Whitney U and Kruskal–Wallis H tests), effect size measures, and Cronbach's alpha. In the qualitative phase, open-ended responses were analyzed using thematic analysis. Results indicated that students reported very positive perceptions of FunEBall across the dimensions of engagement and participation, learning outcomes, physical activity and fitness, and enjoyment and perception. No significant differences were found according to age, gender, or prior playing experience, whereas significant differences were observed across year levels, particularly between first-year and second-year students. The supplementary nonparametric analyses generally supported the robustness of these findings despite the unequal group sizes. The instrument demonstrated excellent internal consistency ($\alpha = .971$). Qualitative findings showed that students perceived FunEBall as fun, engaging, inclusive, collaborative, and supportive of skill development, physical activity, and confidence. Participants also recommended clearer game rules, larger playing areas, longer playing time, and enhanced strategy instruction. Overall, the findings provide preliminary evidence that FunEBall is a well-received and innovative physical education activity with educational potential to support active participation, teamwork, and positive learning experiences. However, these findings should be interpreted in light of the study's methodological limitations, including the small purposive sample and the absence of a control group.

Keywords: FunEBall; physical education; game-based learning; student engagement; inclusive sports

Summary

FunEBall es un deporte de equipo inclusivo que se juega con red y está diseñado para fomentar la cooperación, la participación activa y el disfrute. Este estudio evaluó su implementación en el ámbito de la educación física universitaria utilizando un diseño de métodos mixtos secuencial explicativo. En la fase cuantitativa, se seleccionó a 60 estudiantes de una universidad pública de Davao Oriental (Filipinas) mediante un muestreo intencional. Los datos se recopilaban utilizando la Encuesta de Opinión del Estudiante sobre FunEBall —diseñada por el investigador— y se analizaron mediante estadística descriptiva, pruebas t para muestras independientes, ANOVA, la prueba HSD de Tukey, análisis no paramétricos complementarios (pruebas U de Mann-Whitney y H de Kruskal-Wallis), medidas del tamaño del efecto y el coeficiente alfa de Cronbach. En la fase cualitativa, las respuestas abiertas se analizaron mediante análisis temático. Los resultados indicaron que los estudiantes expresaron percepciones muy positivas sobre FunEBall en cuanto a compromiso y participación, resultados de aprendizaje, actividad física y condición física, así como disfrute y percepción general. No se hallaron diferencias significativas según la edad, el género o la experiencia previa en el juego;



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sin embargo, sí se observaron diferencias significativas según el año de estudios, particularmente entre los estudiantes de primer y segundo año. Los análisis no paramétricos complementarios respaldaron, por lo general, la solidez de estos hallazgos a pesar de la desigualdad en el tamaño de los grupos. El instrumento demostró una excelente consistencia interna ($\alpha = 0,971$). Los resultados cualitativos mostraron que los estudiantes percibían FunEBall como una actividad divertida, motivadora, inclusiva, colaborativa y favorable para el desarrollo de habilidades, la actividad física y la confianza. Asimismo, los participantes sugirieron establecer reglas más claras, contar con áreas de juego más amplias, aumentar el tiempo de juego y mejorar la enseñanza de estrategias. En conjunto, los hallazgos aportan evidencia preliminar de que FunEBall es una actividad de educación física innovadora y bien acogida, con potencial educativo para fomentar la participación activa, el trabajo en equipo y experiencias de aprendizaje positivas. No obstante, estos resultados deben interpretarse teniendo en cuenta las limitaciones metodológicas del estudio, entre ellas el tamaño reducido de la muestra intencional y la ausencia de un grupo de control.

Keywords: FunEBall; Educación Física; aprendizaje basado en juegos; participación estudiantil; deportes inclusivos

Introduction

Physical education plays a vital role in promoting students' physical fitness, motor competence, psychosocial development, and lifelong participation in active lifestyles. Evidence shows that quality physical education contributes positively to students' physical, cognitive, social, and emotional outcomes across educational levels (Bailey *et al.*, 2009; Poitras *et al.*, 2016). In higher education settings, there is a growing need to provide learning experiences that are not only physically beneficial but also enjoyable, inclusive, and responsive to diverse learner needs. Student motivation and enjoyment are consistently associated with stronger participation and continued engagement in physical activity (Zhang & Su, 2026).

Traditional physical education activities remain valuable; however, some conventional approaches may not always maximize participation, confidence, or engagement among all students. Research has shown that learner-centered and autonomy-supportive environments improve motivation, perceived competence, and well-being in physical education contexts (Standage *et al.*, 2025). Likewise, game-based and cooperative learning models have been found to enhance engagement, teamwork, decision-making, and positive attitudes toward participation (Wang *et al.*, 2024). These findings highlight the importance of introducing



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innovative activities that encourage broad participation while maintaining meaningful learning experiences.

FunEBall is a net-based team sport typically played by 4–9 players per team, involving passing, catching, and throwing skills that promote active participation, coordination, and teamwork. It is a novel and inclusive sport invented by Professor Eungsoo Oh of South Korea (Liu *et al.*, 2026), who is also one of the authors of the present study. The researchers met Professor Oh during international conferences held in Thailand and the Philippines, where he conducted FunEBall workshops. During these sessions, the first author gained direct exposure to the game through active participation, demonstrations, and guided instruction on its mechanics, rules, and gameplay. Inspired by its educational and inclusive potential, FunEBall was subsequently introduced in a state university in the province of Davao Oriental as part of physical education classes, facilitated by physical education faculty members who participated in the international conference held in the Philippines.

Despite the potential benefits of innovative activities, limited empirical evidence exists regarding the implementation and acceptability of FunEBall in higher education physical education programs, specifically in Philippine context. Assessing students' perceptions, experiences, and responses is essential in determining whether the activity aligns with contemporary goals of quality physical education such as inclusivity, enjoyment, skill development, and lifelong physical activity promotion.

Hence, this study aimed to evaluate the implementation of FunEBall in physical education classes using an explanatory sequential mixed-methods design. Specifically, it sought to describe the demographic profile of the respondents in terms of age, gender, year level, and prior experience with FunEBall. It also aimed to determine the level of student perceptions regarding FunEBall in the areas of engagement and participation, learning outcomes, physical activity and fitness, and enjoyment and perception. Furthermore, the study examined whether significant differences existed in students' perceptions of FunEBall indicators when grouped according to age, gender, year level, and prior experience with the activity. In addition, the study assessed the internal consistency reliability of the FunEBall Student Feedback Survey using Cronbach's alpha. The qualitative component explored students' experiences, suggestions, and



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perceptions regarding the implementation and regular integration of FunEBall in physical education classes. Finally, the study integrated the quantitative and qualitative findings to provide a comprehensive understanding of the effectiveness and acceptability of FunEBall as an innovative physical education activity.

Methods

Research Design

This study employed an explanatory sequential mixed-methods design (QUAN → qual) to comprehensively evaluate the implementation of FunEBall in specialized physical education classes. In this design, quantitative data were collected and analyzed first to assess students' levels of engagement, learning outcomes, physical activity, and enjoyment and significant difference in terms of age, gender, year level, and prior experience. This was followed by qualitative data collection and analysis to explain and enrich the quantitative findings through students' personal experiences and perceptions.

The use of this design is appropriate as it allows for a more in-depth understanding of complex educational phenomena by integrating statistical trends with contextualized participant narratives, thereby strengthening interpretation and validity of results (Creswell & Plano Clark, 2018; Fetters *et al.*, 2013).

Participants and Sampling

The study was conducted in a state university in the province of Davao Oriental, Philippines, where FunEBall was implemented as part of the physical education program. The institution provides a conducive environment for promoting innovative and inclusive physical education practices aligned with student development and wellness. The participants of the study were students enrolled in specialized physical education classes who were exposed to the implementation of FunEBall during the academic term. A purposive sampling technique was employed to select respondents who met the inclusion criteria, namely: (1) currently enrolled in a major physical education course, and (2) participated in at least one FunEBall session, including both first-time and previously experienced participants. A total of 60 respondents



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were included in the study out of 125 students who were initially identified during the data collection period.

Research Instrument

The primary instrument used in this study was a researcher-developed survey questionnaire called “*FunEBall Student Feedback Survey*.” The instrument was designed to gather comprehensive data on students’ experiences, perceptions, and learning outcomes related to the implementation of FunEBall in physical education classes. It consisted of six sections: 1. General Information, which included respondents’ age, gender, year level, and prior experience with FunEBall; 2. Engagement and Participation (4 items), which measured students’ level of involvement, motivation, teamwork, and perceived inclusivity during the activity; 3. Learning Outcomes (3 items), which assessed perceived improvements in motor skills, understanding of game rules, and critical thinking; 4. Physical Activity and Fitness (3 items), which evaluated levels of exertion, endurance, and overall physical activity; 5. Enjoyment and Perception (3 items), which examined students’ enjoyment, willingness to participate again, and perceptions of inclusivity; and 6. Three open-ended questions which captured qualitative responses regarding students’ experiences, suggestions for improvement, and views on the integration of FunEBall into physical education classes. The Likert-scale items were measured using a 5-point scale ranging from 1 (Strongly Disagree/Never) to 5 (Strongly Agree/Always).

To ensure the validity of the researcher-developed questionnaire, it underwent content validation by three experts: a faculty member with a PhD in Physical Education, a faculty member with an EdD in Educational Management, and a specialist in Research Methods. Using an institutional validation form, the experts evaluated each item for clarity, relevance, appropriateness, and alignment with the study objectives. Their feedback was incorporated by refining item wording, improving clarity, and ensuring consistency before the instrument was administered. For reliability, the internal consistency of the Likert-scale items was assessed using Cronbach’s Alpha, with a threshold value of $\alpha = .971$, indicating excellent internal consistency.



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Data Gathering Procedure

The data gathering process followed a systematic procedure to ensure the accuracy, consistency, and integrity of the collected data. Prior to the conduct of the study, permission and coordination were secured from the relevant university authorities and course instructors. Participants were then oriented regarding the purpose of the study, the procedures involved, and the ethical considerations, including voluntary participation and confidentiality.

Following the orientation, FunEBall was implemented during regular physical education classes over four sessions, with each session lasting 120 minutes. The game was played on a court approximately the size of a standard badminton court. At the beginning of each session, the instructor explained the objectives, game rules, and safety precautions, followed by a demonstration of the fundamental skills and mechanics of FunEBall. The game followed the ABC principle: A (Aim), in which players aimed the ball toward an open area of the opponent's court during serves and rallies; B (Bounce), requiring the ball to bounce once before being served; and C (Catch and Cast), whereby players caught the ball after its first bounce and then cast (passed or threw) it to a teammate or toward the opponent's court.

Gameplay also adhered to the 3-5-7 rule. The number 3 represented the minimum of three consecutive passes before throwing the ball to the opponent's court. The number 5 indicated that each team consisted of five players, and the player in possession of the ball was allowed to run, skip, or leap for up to five steps. The number 7 represented the maximum of seven consecutive team passes. A successful attack earned one point after three to six passes and two points after seven passes if the opposing team failed to catch the ball. Each match was played to 11 points, with a sudden-death point used to break a 10–10 tie. Throughout the intervention, the instructor facilitated gameplay, ensured adherence to the rules, promoted teamwork and fair play, and provided guidance and feedback.

Upon completion of the intervention, participants completed the researcher-developed FunEBall Student Feedback Survey, which was administered through Google Forms to ensure convenience, efficiency, and reduced researcher influence during data collection. Participants also responded to open-ended questions regarding their experiences, observations, and



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suggestions for improving the activity. Finally, all quantitative and qualitative data were encoded, organized, tabulated, and prepared for subsequent statistical and thematic analyses.

Data Analysis Procedure

Quantitative data were analyzed using descriptive and inferential statistics. Descriptive statistics included frequency and percentage for the demographic profile of the respondents, while mean and standard deviation were used to summarize responses to the Likert-scale items. The survey items were grouped into four constructs, namely: Engagement and Participation, Learning Outcomes, Physical Activity and Fitness, and Enjoyment and Inclusivity. Composite mean scores were computed for each construct and interpreted using the following scale: 4.21–5.00 (Very High), 3.41–4.20 (High), 2.61–3.40 (Moderate), 1.81–2.60 (Low), and 1.00–1.80 (Very Low).

Inferential statistical analyses were performed to determine whether significant differences existed in the FunEBall indicators across selected demographic variables. ANOVA was used to examine differences according to age and year level, while independent-samples *t*-tests were conducted to assess differences based on gender and prior experience with FunEBall (played vs. not played). When statistically significant differences were observed in the year-level comparisons, Tukey's HSD post hoc test was performed to identify the specific groups that differed significantly.

To assess the robustness of the parametric findings and address potential concerns regarding the assumptions of normality and unequal group sizes, supplementary non-parametric analyses were also conducted. The Mann–Whitney *U* test and Kruskal–Wallis *H* test were used as non-parametric counterparts to confirm the findings to the independent-samples *t*-test and one-way ANOVA, respectively. Effect sizes were likewise calculated to determine the magnitude of the observed differences. Furthermore, Cronbach's alpha was computed to assess the internal consistency reliability of the instrument, and all statistical analyses were conducted at a predetermined level of significance.

Qualitative data from the open-ended responses were analyzed using thematic analysis. The process involved familiarization with the data through repeated reading of responses,



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followed by coding of significant statements relevant to the research questions. These codes were then organized to identify recurring patterns, which served as the basis for developing themes. The emerging themes were subsequently reviewed, refined, and interpreted to capture the meaning of students' experiences, perceptions, and suggestions regarding FunEBall. These qualitative themes were then used to explain and complement the quantitative findings of the study.

The integration of quantitative and qualitative data was conducted during the interpretation phase using a connecting and explanatory approach. In this process, the qualitative findings were employed to provide context and explanation for the quantitative results. For instance, high engagement scores were further explained by student narratives describing enjoyment, active participation, and teamwork during FunEBall sessions, while moderate levels of understanding of game rules were supported by responses indicating initial confusion and the need for clearer instructions. This integrated analysis provided a more comprehensive and in-depth evaluation of FunEBall within the physical education context.

Ethical Considerations

This study was conducted in full compliance with ethical standards for research involving human participants. Prior to data collection, participants were fully informed about the purpose of the study, the procedures involved, and their rights as respondents. Written informed consent was obtained from all participants, emphasizing the voluntary nature of participation and their right to withdraw from the study at any time without penalty.

Confidentiality and anonymity were strictly observed throughout the research process. All responses were treated with utmost privacy, and data were securely stored and accessed only by the research team. Ethical safeguards were also integrated into the design and administration of the instrument to minimize any potential discomfort or undue pressure on respondents, thereby ensuring that participants could freely and honestly share their experiences in a safe, respectful, and non-coercive environment.



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Results

TABLE 1. Frequency and Percentage Distribution of Respondents According to Demographic Profile (n = 60)

Profile Variable	Category	Frequency	Percentage (%)
Age	18–20 years old	21	35.00
	21–23 years old	35	58.33
	24–26 years old	4	6.67
Gender	Male	27	45.00
	Female	33	55.00
Year Level	First Year	5	8.33
	Second Year	18	30.00
	Third Year	9	15.00
	Fourth Year	28	46.67
Prior Experience (Played vs. Not played)	Yes	34	56.67
	No	26	43.33

Table 1 presents the demographic profile of the respondents. In terms of age, the majority were 21–23 years old (35, 58.33%), followed by 18–20 years old (21, 35.00%), while only 4 respondents (6.67%) belonged to the 24–26 years old group. Regarding gender, female respondents comprised the larger proportion (33, 55.00%), while male respondents accounted for 27 (45.00%). As to year level, most respondents were Fourth Year students (28, 46.67%), followed by Second Year (18, 30.00%), Third Year (9, 15.00%), and First Year (5, 8.33%). In terms of prior experience, more than half of the respondents indicated that they had previously played FunEBall (34, 56.67%), while 26 (43.33%) reported no prior experience.

TABLE 2. Summary of Respondents' Evaluation of FunEBall Based on Key Indicators

Indicators	Mean	SD	Interpretation
Engagement and Participation	4.24	0.85	Very High
Learning Outcomes	4.38	0.77	Very High
Physical Activity and Fitness	4.23	0.94	Very High
Enjoyment and Perception	4.38	0.80	Very High
Grand Mean	4.31	0.85	Very High

Table 2 summarizes the respondents' evaluation of FunEBall across four key indicators. Among the indicators, Learning Outcomes and Enjoyment and Perception obtained the highest



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mean scores ($M = 4.38$), both interpreted as Very High, suggesting that respondents found FunEBall effective for learning and enjoyable to play. Engagement and Participation ($M = 4.24$, $SD = 0.85$) and Physical Activity and Fitness ($M = 4.23$, $SD = 0.94$) also received Very High ratings, indicating active involvement and perceived physical benefits. Overall, the findings yielded a *grand mean of 4.31* ($SD = 0.85$), described as *Very High*, which signifies a highly favorable perception of FunEBall as a physical education activity. The relatively low standard deviation values further indicate consistency in respondents' answers. Collectively, these results affirm that FunEBall is an effective and well-accepted activity for enhancing student engagement, learning, fitness, and enjoyment in physical education classes.

TABLE 3. Significant Difference of FunEBall Indicators in terms of Respondents' Profile

Profile Variable	Indicator	Test Value	p-value	Decision
Age	Engagement & Participation	$F = 2.35$	0.105	Fail to Reject H_0
	Learning Outcomes	$F = 0.45$	0.642	Fail to Reject H_0
	Physical Activity & Fitness	$F = 0.36$	0.698	Fail to Reject H_0
	Enjoyment & Perception	$F = 0.44$	0.645	Fail to Reject H_0
Gender	Engagement & Participation	$t = 1.34$	0.185	Fail to Reject H_0
	Learning Outcomes	$t = 1.37$	0.177	Fail to Reject H_0
	Physical Activity & Fitness	$t = 0.58$	0.567	Fail to Reject H_0
	Enjoyment & Perception	$t = 0.95$	0.348	Fail to Reject H_0
Year Level	Engagement & Participation	$F = 3.71$	0.017	Reject H_0
	Learning Outcomes	$F = 5.53$	0.002	Reject H_0
	Physical Activity & Fitness	$F = 3.82$	0.015	Reject H_0
	Enjoyment & Perception	$F = 5.14$	0.003	Reject H_0
Playing Experience	Engagement & Participation	$t = 0.97$	0.336	Fail to Reject H_0
	Learning Outcomes	$t = 0.32$	0.747	Fail to Reject H_0
	Physical Activity & Fitness	$t = -0.09$	0.930	Fail to Reject H_0
	Enjoyment & Perception	$t = -0.07$	0.948	Fail to Reject H_0

Table 3 revealed that no significant differences existed in FunEBall indicators when respondents were grouped according to age, gender, and playing experience ($p > .05$). However, significant differences were observed when grouped according to year level across all indicators: engagement and participation, learning outcomes, physical activity and fitness, and



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enjoyment and perception ($p < .05$). This suggests that year level influences how students perceive the effectiveness and enjoyment of FunEBall.

TABLE 4. Tukey HSD Post Hoc Comparisons of Year Level Differences on FunEBall Indicators

Indicators	Comparison	Mean Difference	<i>p</i>	95% CI
Engagement and Participation	First Year – Second Year	-1.11	.014*	[-2.03, -0.19]
	First Year – Third Year	-0.58	.439	[-1.62, 0.46]
	First Year – Fourth Year	-0.81	.091	[-1.69, 0.07]
	Second Year – Third Year	0.53	.226	[-0.23, 1.29]
	Second Year – Fourth Year	0.30	.505	[-0.38, 0.98]
	Third Year – Fourth Year	-0.23	.800	[-1.04, 0.58]
Learning Outcomes	First Year – Second Year	-1.24	.002*	[-2.07, -0.41]
	First Year – Third Year	-0.63	.287	[-1.57, 0.31]
	First Year – Fourth Year	-0.82	.053	[-1.62, -0.02]
	Second Year – Third Year	0.61	.088	[-0.08, 1.30]
	Second Year – Fourth Year	0.42	.153	[-0.20, 1.04]
	Third Year – Fourth Year	-0.19	.853	[-0.93, 0.55]
Physical Activity and Fitness	First Year – Second Year	-1.41	.008*	[-2.44, -0.38]
	First Year – Third Year	-0.90	.217	[-2.07, 0.27]
	First Year – Fourth Year	-1.02	.071	[-2.01, -0.03]
	Second Year – Third Year	0.51	.420	[-0.34, 1.36]
	Second Year – Fourth Year	0.39	.432	[-0.37, 1.15]
	Third Year – Fourth Year	-0.12	.979	[-1.03, 0.79]
Enjoyment and Perception	First Year – Second Year	-1.34	.002*	[-2.25, -0.43]
	First Year – Third Year	-0.77	.204	[-1.80, 0.26]
	First Year – Fourth Year	-1.01	.024*	[-1.88, -0.14]
	Second Year – Third Year	0.57	.175	[-0.18, 1.32]
	Second Year – Fourth Year	0.33	.411	[-0.34, 1.00]
	Third Year – Fourth Year	-0.24	.792	[-1.04, 0.56]

NOTE. Tukey Honestly Significant Difference (HSD) test was conducted following significant one-way ANOVA results for year level. Confidence intervals (CI) are reported at 95%. Negative mean differences indicate that the first group had lower scores than the comparison group.

Furthermore, Table 4 presents the Tukey HSD post hoc test, which revealed that the significant differences across year levels were mainly between *First Year and Second Year students*. Specifically, Second Year students reported significantly higher ratings than First Year



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students in *Engagement and Participation* ($MD = -1.11, p = .014, 95\% \text{ CI } [-2.03, -0.19]$), *Learning Outcomes* ($MD = -1.24, p = .002, 95\% \text{ CI } [-2.07, -0.41]$), *Physical Activity and Fitness* ($MD = -1.41, p = .008, 95\% \text{ CI } [-2.44, -0.38]$), and *Enjoyment and Perception* ($MD = -1.34, p = .002, 95\% \text{ CI } [-2.25, -0.43]$). In addition, *Fourth Year students* rated *Enjoyment and Perception* significantly higher than First Year students ($MD = -1.01, p = .024, 95\% \text{ CI } [-1.88, -0.14]$). No other pairwise comparisons reached statistical significance. These findings suggest that students with greater university exposure may have a more positive appreciation and response toward FunEBall activities. Practically, this implies that First Year students may need more orientation, confidence-building, and familiarization with FunEBall, while Second Year students appear to be the most receptive group, and Fourth Year students particularly value the enjoyment aspect of the activity.

TABLE 5. Effect Sizes (η^2) for the Significant Differences in FunEBall Indicators by Year Level

Indicators	F	p	η^2	Interpretation
Engagement and Participation	3.708	.017	.166	Large
Learning Outcomes	5.532	.002	.229	Large
Physical Activity and Fitness	3.819	.015	.170	Large
Enjoyment and Perception	5.139	.003	.216	Large

NOTE. η^2 (eta squared) was computed as the ratio of the between-group sum of squares to the total sum of squares. Following common guidelines, η^2 values of approximately .01, .06, and .14 indicate *small*, *medium*, and *large* effects, respectively.

Further, Table 5 shows the effect sizes (η^2) for the significant differences in FunEBall indicators by year level to complement the significant tests. All four indicators demonstrated *large effect sizes*, with η^2 values ranging from .166 to .229. This indicates that year level accounted for approximately 16.6% to 22.9% of the variance in students' perceptions of engagement and participation, learning outcomes, physical activity and fitness, and enjoyment and perception. These results suggest that the observed differences were not only statistically significant but also practically meaningful.



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TABLE 6. Supplementary Nonparametric Robustness Analysis of FunEBall Indicators

Profile Variable	Indicators	Test Value	<i>p</i>	Effect Size	Decision
Age	Engagement & Participation	H = 7.26	.027	$\varepsilon^2 = .09$	Reject H_0
	Learning Outcomes	H = 1.09	.579	$\varepsilon^2 = .01$	Fail to Reject H_0
	Physical Activity & Fitness	H = 0.40	.818	$\varepsilon^2 = .00$	Fail to Reject H_0
	Enjoyment and Perception	H = 0.57	.751	$\varepsilon^2 = .01$	Fail to Reject H_0
Gender	Engagement & Participation	U = 489.50	.325	$r = .09$	Fail to Reject H_0
	Learning Outcomes	U = 469.50	.492	$r = .06$	Fail to Reject H_0
	Physical Activity & Fitness	U = 477.50	.415	$r = .08$	Fail to Reject H_0
	Enjoyment and Perception	U = 458.00	.604	$r = .05$	Fail to Reject H_0
Year Level	Engagement & Participation	H = 8.41	.038	$\varepsilon^2 = .10$	Reject H_0
	Learning Outcomes	H = 13.66	.003	$\varepsilon^2 = .19$	Reject H_0
	Physical Activity & Fitness	H = 11.15	.011	$\varepsilon^2 = .14$	Reject H_0
	Enjoyment and Perception	H = 8.88	.031	$\varepsilon^2 = .10$	Reject H_0
Playing Experience	Engagement & Participation	U = 520.00	.145	$r = .15$	Fail to Reject H_0
	Learning Outcomes	U = 486.50	.339	$r = .09$	Fail to Reject H_0
	Physical Activity & Fitness	U = 429.50	.956	$r = .01$	Fail to Reject H_0
	Enjoyment and Perception	U = 441.00	.808	$r = .03$	Fail to Reject H_0

NOTE. Kruskal–Wallis H tests were conducted for profile variables with more than two groups (Age and Year Level), whereas Mann–Whitney U tests were conducted for variables with two groups (Gender and Playing Experience). Epsilon squared (ε^2) and rank-biserial effect size (r) were calculated to estimate the magnitude of the observed effects.

Table 6 presents the supplementary nonparametric robustness analysis conducted to verify the stability of the ANOVA findings in light of the unequal group sizes across certain respondent categories. Consistent with the parametric results, significant differences were observed across *year levels* for all four FunEBall indicators, with small to moderate effect sizes ($\varepsilon^2 = .10$ – $.19$). Likewise, *gender* and *playing experience* showed no statistically significant differences across any of the indicators. For *age*, a significant difference was observed only for *Engagement and Participation* ($H = 7.26$, $p = .027$, $\varepsilon^2 = .09$), whereas no significant differences were found for the remaining indicators. Overall, the nonparametric analyses produced findings that were generally consistent with the primary ANOVA results, supporting the robustness of the study's conclusions despite the unequal group sizes.



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TABLE 7. Item Analysis of the FunEBall Questionnaire: Corrected Item–Total Correlation and Cronbach’s Alpha if Item Deleted

Items	Corrected Item– Total Correlati on	Cronbach ’s α if Item Deleted	Interpretat ion
Engagement and Participation (4 items)	.903	.966	Retain
I participated during FunEBall sessions	.781	.969	Retain
I felt motivated to join and play FunEBall.	.823	.968	Retain
FunEBall encouraged teamwork and cooperation with classmates.	.847	.968	Retain
I was given equal opportunities to play during the game.	.816	.968	Retain
Learning Outcomes (3 items)	.934	.963	Retain
FunEBall helped improve my basic motor skills (running, catching, throwing).	.874	.967	Retain
I understood the rules of FunEBall easily.	.889	.967	Retain
I learned to strategize and think critically while playing FunEBall.	.901	.966	Retain
Physical Activity and Fitness (3 items)	.946	.961	Retain
FunEBall helped improve my cardiovascular endurance.	.903	.966	Retain
I experienced physical exertion or sweating while playing FunEBall.	.914	.965	Retain
Compared to other sports, FunEBall is more active	.872	.967	Retain
Enjoyment and Perception (3 items)	.952	.960	Retain
I enjoyed playing FunEBall.	.917	.965	Retain
I would like to play FunEBall again in future PE classes.	.924	.965	Retain
FunEBall is inclusive and enjoyable regardless of skill or physical ability.	.912	.965	Retain
Overall (13 items)	-	.971	Excellent

Table 7 presents the item analysis of the FunEBall questionnaire using corrected item–total correlation and Cronbach’s alpha if item deleted. At the indicator level, Engagement and Participation ($\alpha = .966$), Learning Outcomes ($\alpha = .963$), Physical Activity and Fitness ($\alpha = .961$), and Enjoyment and Perception ($\alpha = .960$) all demonstrated excellent reliability. Their corrected item–total correlations ranged from .903 to .952, indicating that each indicator was strongly associated with the total scale and contributed substantially to measuring students’ perceptions of FunEBall.



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At the item level, all statements exceeded the acceptable threshold for corrected item–total correlation (.30), with values ranging from .781 to .924. This indicates that every item had a strong positive relationship with the overall questionnaire. Moreover, the Cronbach's alpha if item deleted values ranged from .965 to .969, all of which were lower than the overall alpha coefficient of .971. This suggests that removing any item would not improve the reliability of the instrument.

The overall 13-item scale obtained a Cronbach's alpha of .971, interpreted as Excellent, indicating a very high level of internal consistency and reliability. Thus, the findings confirm that all indicators and items were reliable and should be retained, demonstrating that the FunEBall questionnaire is a dependable tool for assessing student engagement, learning outcomes, physical activity, and enjoyment in physical education classes.



FIGURE 1. Thematic Map of Students' Experiences in FunEBall

Figure 1 shows the thematic map of students' experiences with FunEBall, highlighting eight major findings that collectively describe the game as a fun, inclusive, and engaging



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activity for all participants. First, participants emphasized *fun, enjoyment, and positive emotional experience*, describing the game as enjoyable, exciting, happy, memorable, and effective in relieving stress. Second, students highlighted *high engagement and active participation*, noting that the gameplay was interactive, fast-paced, and encouraged sustained movement and participation. Third, the game promoted *teamwork, collaboration, and social interaction*, as respondents valued the cooperation, communication, unity, and strong alliance developed while playing.

Fourth, FunEBall demonstrated *inclusivity and accessibility for all learners*, with students recognizing that it can be played regardless of age or gender, is easy to learn, and creates a welcoming environment for everyone. Fifth, participants identified *skill development and motor learning*, particularly in fundamental skills such as running, catching, passing, throwing, and improving techniques through practice and game rules. Sixth, FunEBall also fostered *cognitive engagement through strategy and decision-making*, requiring players to think critically, make tactical decisions, plan strategies, and adapt during gameplay. Seventh, students appreciated the *novelty and unique learning experience* of the game, describing it as new, innovative, and distinct from traditional sports, which sparked curiosity and interest. Finally, the game enhanced *emotional confidence and reduced sport anxiety*, as it was perceived as non-intimidating, safe, and capable of building confidence, especially among hesitant players.

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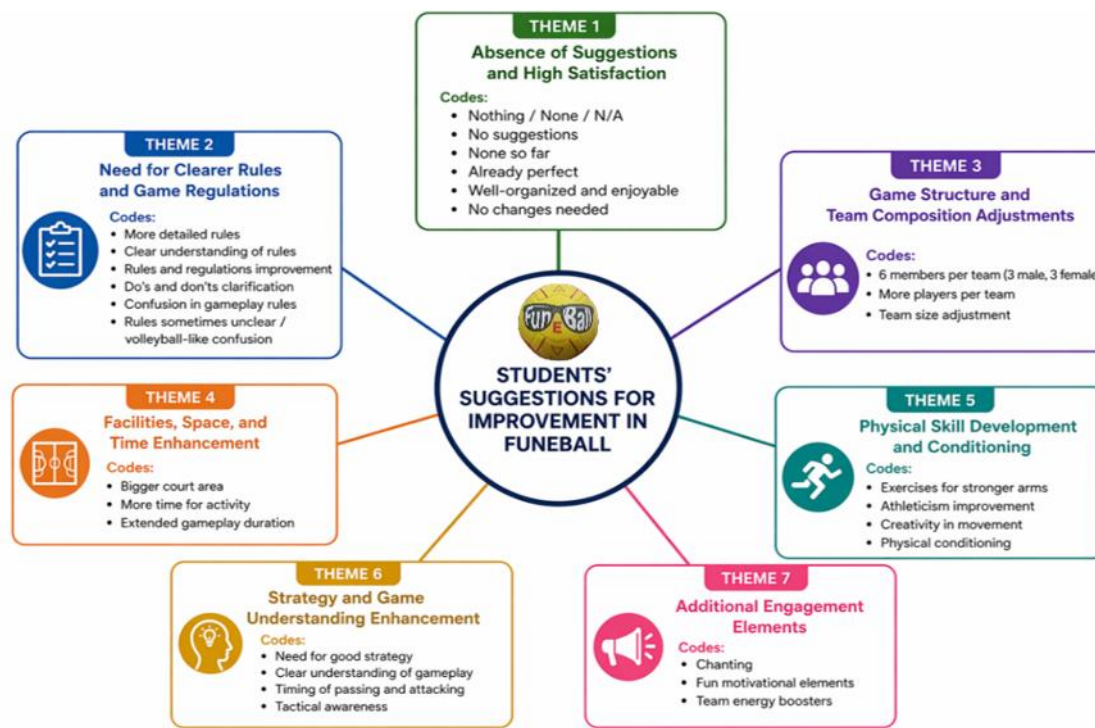


FIGURE 2. Thematic Map of Students' Suggestions for Improvement in FunEBall

In Figure 2, the thematic analysis identified seven key findings that reflect both high satisfaction with the game and constructive recommendations for further enhancement. First, the most prominent theme was *absence of suggestions and high satisfaction*, as many respondents indicated no concerns, no suggestions, or stated that the game was already perfect, well-organized, enjoyable, and required no changes. This suggests that students generally had a positive perception of FunEBall and were satisfied with its current implementation. Second, some participants identified a *need for clearer rules and game regulations*, emphasizing the importance of more detailed instructions, clearer understanding of gameplay rules, improvement of rules and regulations, and reducing confusion, particularly with similarities to volleyball-like mechanics. Third, respondents recommended *game structure and team composition adjustments*, such as increasing the number of players per team, proposing balanced team compositions (e.g., three male and three female players), and modifying team size to improve participation and competitiveness. Fourth, students highlighted the need for better *facilities, space, and time enhancement*, suggesting a bigger playing court, more time for

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activity sessions, and longer gameplay duration to maximize enjoyment and engagement. Fifth, some respondents proposed greater focus on *physical skill development and conditioning*, including exercises for stronger arms, improvement in athleticism, creativity in movement, and overall physical conditioning. Sixth, students expressed the importance of *strategy and game understanding enhancement*, recommending better strategic preparation, clearer understanding of gameplay mechanics, improved timing in passing and attacking, and stronger tactical awareness. Lastly, participants suggested adding *additional engagement elements*, such as chanting, fun motivational components, and team energy boosters to make the game more exciting and spirited.

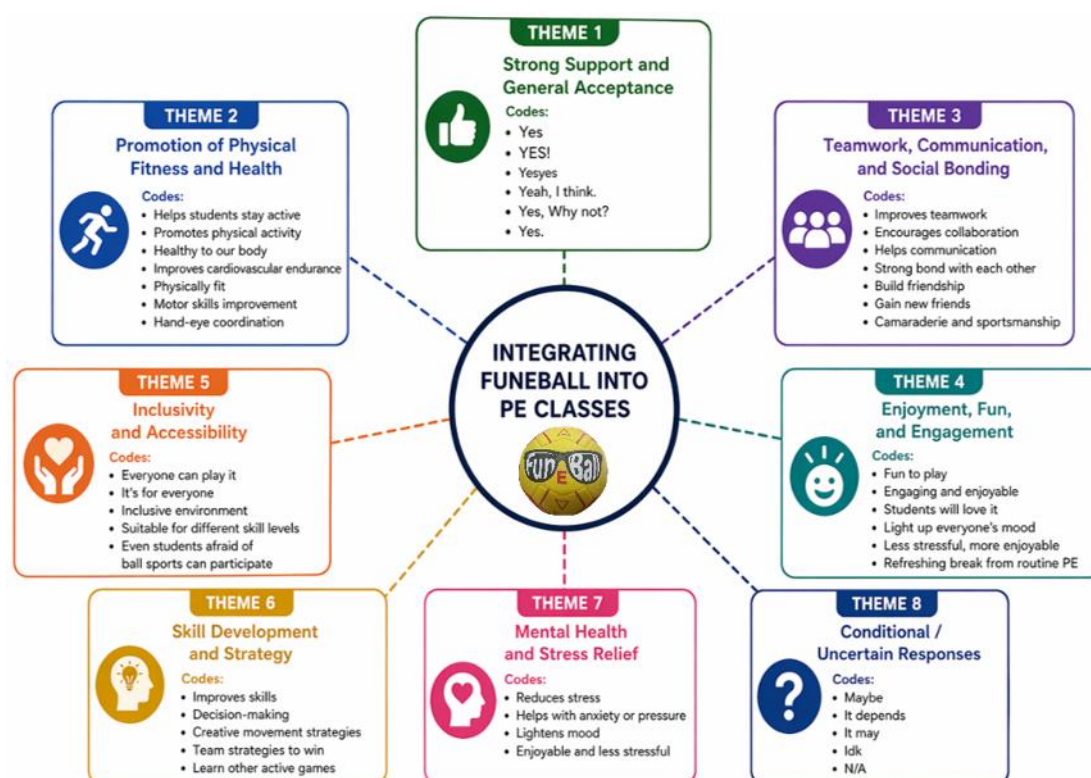


FIGURE 3. Thematic Map of Students' Responses on Integrating FunEBall into PE Classes

Figure 3 presents the thematic map on integrating FunEBall into Physical Education classes revealed eight major findings that demonstrate strong student support for its inclusion as a learning activity. First, the most dominant theme was *strong support and general acceptance*, as many respondents directly expressed approval through statements such as “yes,”



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“YES,” and similar affirmations, indicating broad willingness to integrate FunEBall into PE classes. Second, students recognized the *promotion of physical fitness and health*, noting that the game helps learners stay active, promotes physical activity, supports a healthy body, improves cardiovascular endurance, enhances motor skills, and develops hand-eye coordination. Third, respondents highlighted the value of *teamwork, communication, and social bonding*, emphasizing that FunEBall improves teamwork, encourages collaboration, strengthens communication, fosters unity, builds friendships, and develops camaraderie and sportsmanship. Fourth, students associated the game with *enjoyment, fun, and engagement*, describing it as fun to play, enjoyable, capable of lifting everyone’s mood, less stressful, and a refreshing break from routine PE activities. Fifth, participants identified *inclusivity and accessibility* as a major strength, stating that everyone can play it, it is suitable for learners of different skill levels, creates an inclusive environment, and even students who are afraid of ball sports can participate comfortably. Sixth, students acknowledged opportunities for *skill development and strategy*, explaining that the game improves skills, encourages decision-making, develops creative movement strategies, enhances team tactics, and may even help learners adapt to other physical activities. Seventh, respondents connected FunEBall with *mental health and stress relief*, reporting that it reduces stress, helps with anxiety or pressure, lightens mood, and makes participation more enjoyable and less stressful. Finally, a smaller group of responses reflected *conditional or uncertain opinions*, with statements such as “maybe,” “it depends,” or “I don’t know,” suggesting that some students may need further exposure or clarification before fully supporting its integration.



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TABLE 8. Joint Display of Quantitative-Qualitative Corroboration

Quantitative Results (Phase 1)	Key Statistical Evidence	Qualitative Themes (Phase 2)	Qualitative Explanation of Quantitative Findings	Meta-Inference / Integrated Interpretation
Engagement and Participation	$\alpha = .966$; Corrected item-total correlation = .903	Fun, Enjoyment and Positive Emotional Experience; High Engagement and Active Participation; Teamwork, Collaboration and Social Interaction	Students described FunEBall as exciting, interactive, fast-paced, and enjoyable. They reported active involvement, equal participation, and strong teamwork during gameplay.	High engagement ratings were corroborated by students' lived experiences of enjoyable, socially interactive, and movement-rich participation.
Learning Outcomes	$\alpha = .963$; Corrected item-total correlation = .934	Skill Development and Motor Learning; Cognitive Engagement; Strategy and Decision-Making	Students perceived improvements in running, catching, passing, throwing, and tactical thinking. They also reported learning strategies and adapting decisions during the game.	Strong learning outcome scores were explained by both psychomotor and cognitive learning opportunities embedded in FunEBall.
Physical Activity and Fitness	$\alpha = .961$; Corrected item-total correlation = .946	High Engagement and Active Participation; Physical Skill Development and Conditioning	Participants noted constant movement, sweating, cardiovascular exertion, and improved athletic ability during play.	Quantitative fitness perceptions were validated by qualitative accounts of vigorous and physically demanding gameplay.
Enjoyment and Perception	$\alpha = .960$; Corrected item-total correlation = .952	Fun, Enjoyment and Positive Emotional Experience; Novelty and Unique Learning Experience; Emotional Confidence and Reduced Sport Anxiety	Students described FunEBall as fun, refreshing, memorable, stress-relieving, and something they wanted to play again. They appreciated the novelty and non-intimidating environment.	Positive enjoyment ratings were reinforced by emotional, motivational, and novelty-based experiences.
Inclusivity (Embedded across Items)	Item loading strong; "Inclusive and enjoyable regardless of skill" = .912	Inclusivity and Accessibility for All Learners; Inclusivity and Accessibility	Students emphasized that everyone can play regardless of age, gender, or skill level, including hesitant learners.	FunEBall was perceived as an inclusive PE activity that promotes broad participation.



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Quantitative Results (Phase 1)	Key Statistical Evidence	Qualitative Themes (Phase 2)	Qualitative Explanation of Quantitative Findings	Meta-Inference / Integrated Interpretation
Future Acceptance / Sustainability	“Would like to play again in future PE classes” = .924	Strong Support and General Acceptance; Integrating FunEBall into PE Classes	Many respondents directly supported inclusion of FunEBall in PE and expressed willingness to participate again.	Students’ positive intentions indicate high acceptability and sustainability for curriculum integration.
Areas for Improvement (Not measured directly in survey)	Not captured quantitatively	Need for Clearer Rules and Regulations; Facilities, Space and Time Enhancement; Strategy and Game Understanding Enhancement; Additional Engagement Elements	Students suggested clearer rules, larger space, longer time, improved strategy teaching, and motivational elements.	While quantitative ratings were highly positive, qualitative findings identified practical enhancements for better implementation.
Overall Instrument Evaluation	Overall Cronbach’s α = .971 (Excellent)	Broadly positive narratives across all thematic maps	Consistent positive narratives aligned with strong psychometric reliability of the instrument.	Quantitative consistency and qualitative convergence jointly confirm that FunEBall is an effective, engaging, and acceptable PE innovation.

Table 8 exhibited the joint display of quantitative–qualitative corroboration revealed strong convergence between the statistical results and students’ narrative experiences of FunEBall, consistent with the explanatory sequential mixed methods design. In the quantitative phase, the questionnaire demonstrated excellent internal consistency (Overall Cronbach’s α = .971), with all four dimensions—Engagement and Participation (α = .966), Learning Outcomes (α = .963), Physical Activity and Fitness (α = .961), and Enjoyment and Perception (α = .960)—showing highly reliable responses. These strong numerical findings were subsequently explained and validated by the qualitative themes generated from students’ responses.

For Engagement and Participation, the high reliability score was corroborated by qualitative themes describing FunEBall as interactive, exciting, fast-paced, and highly participatory. Students reported active involvement, equal opportunities to play, and sustained



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engagement throughout the sessions. Themes on teamwork, collaboration, and social interaction further explained that engagement was strengthened by cooperation, communication, and social bonding among classmates. This indicates that students' strong quantitative ratings were grounded in meaningful and enjoyable participation experiences.

The positive quantitative findings for Learning Outcomes were also supported by qualitative evidence. Students explained that FunEBall improved their fundamental motor skills such as running, catching, passing, and throwing, while also developing decision-making, critical thinking, and strategic awareness. These responses confirm that learning occurred not only in physical skill execution but also in cognitive and tactical domains. Thus, the strong statistical ratings for learning outcomes were validated by students' direct experiences of multidimensional learning.

Similarly, the quantitative results for Physical Activity and Fitness were reinforced by qualitative themes emphasizing constant movement, sweating, cardiovascular exertion, and athletic improvement. Students perceived the game as physically demanding, active, and beneficial for conditioning. Some respondents even suggested incorporating additional drills and conditioning activities, further reflecting their recognition of FunEBall's fitness value. These findings explain why the quantitative data showed strong agreement that FunEBall promotes physical activity more effectively than many traditional games.

For Enjoyment and Perception, qualitative findings strongly corroborated the statistical results. Students consistently described FunEBall as fun, refreshing, enjoyable, memorable, and stress-relieving. Many expressed willingness to play again in future PE classes, while others highlighted the game's novelty and uniqueness compared with traditional sports. Themes related to emotional confidence and reduced sport anxiety also indicated that students appreciated the safe, non-intimidating, and supportive environment created by the activity. These narratives confirm that positive enjoyment ratings were rooted in emotional satisfaction, motivation, and psychological comfort.

An additional area of corroboration involved inclusivity and accessibility. Quantitative items related to equal opportunities and enjoyment regardless of skill level were supported by qualitative themes stating that everyone could participate regardless of age, gender, ability, or



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prior sports experience. Students noted that even those who were hesitant or afraid of ball sports felt comfortable joining FunEBall. This suggests that inclusivity is one of the game's strongest educational values.

Although the quantitative results were overwhelmingly positive, the qualitative phase also extended the findings by identifying practical areas for improvement not directly captured in the survey. Students recommended clearer rules and regulations, adjustments in team composition, larger playing spaces, longer activity time, stronger strategy instruction, and additional motivational elements such as chanting and team energy boosters. These suggestions indicate that students were satisfied with the game but also saw opportunities to enhance implementation quality.

Overall, the integration of quantitative and qualitative findings demonstrates substantial corroboration across all domains. The quantitative data statistically confirmed high perceptions of engagement, learning, fitness, enjoyment, and inclusivity, while the qualitative findings explained the reasons behind these perceptions through students' lived experiences. Together, the results provide compelling evidence that FunEBall is an effective, innovative, and student-centered Physical Education activity with strong potential for broader curricular adoption.

Discussion

The present study found that FunEBall produced highly positive results in engagement, learning outcomes, physical activity, and enjoyment, highlighting its value as an innovative and student-centered physical education activity. These findings are consistent with prior studies showing that learner-centered models improve motivation, participation, and learning attitudes (Zhang *et al.*, 2024; Yao *et al.*, 2025). Enjoyable and inclusive activities also enhance motivation and prosocial attitudes (Manninen & Campbell, 2022), while increasing physical activity and wellness among students (Choi *et al.*, 2024).

The very high ratings in engagement and participation indicate that FunEBall effectively motivates students to become actively involved in class activities. This is significant in physical education, where disengagement and passive participation are recurring concerns. These findings are consistent with previous studies showing that enjoyable and cooperative learning



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environments enhance student motivation and sustained involvement. Ntoumanis (2005) found that autonomy-supportive physical education settings increase participation and intrinsic motivation. Hastie *et al.* (2011) reported that Sport Education promotes active engagement, teamwork, and responsibility among learners. Likewise, Manninen and Campbell (2022) concluded that student-centered sport models improve motivation, competence, and relatedness. Furthermore, enjoyable physical education experiences are associated with stronger exercise intentions and higher physical activity participation (Taylor *et al.*, 2010; Gråstén & Watt, 2017), supporting the effectiveness of FunEBall.

In terms of learning outcomes, respondents perceived FunEBall as effective in improving motor skills and cognitive abilities. This aligns with studies showing that student-centered and game-based PE approaches enhance psychomotor and cognitive learning. The Sport Education Model improves skill execution and tactical understanding (Hastie *et al.*, 2011) and learning attitudes and decision-making (Zhang *et al.*, 2024). Cooperative game-based strategies strengthen tactical and collaborative skills (Ávalos-Ramos & Martínez Ruiz, 2020), while meta-analyses confirm gains in cognitive and behavioral outcomes (Yao *et al.*, 2025).

FunEBall promotes physical activity and fitness, as students described it as movement-rich and physically demanding, supporting endurance and conditioning development. This is consistent with evidence that school-based physical activity interventions significantly increase moderate-to-vigorous physical activity in physical education settings (Lonsdale *et al.*, 2013). Similarly, systematic reviews confirm improvements in physical activity and fitness outcomes among youth through structured school-based programs (Yuksel *et al.*, 2020; Kriemler *et al.*, 2020). *Inclusive physical activity interventions have also been shown to improve health, motor skills, and physical condition among learners with diverse needs, further emphasizing the value of adaptable and accessible movement programs in education settings* (García Calvo-Rojo, 2026). In addition, gamification-based interventions enhance engagement and physical activity through increased motivation and enjoyment (Wang *et al.*, 2025).

Likewise, the very high ratings in enjoyment and perception highlight the affective strengths of FunEBall. Students described the activity as fun, refreshing, and stress-relieving. Self-Determination Theory explains that high-quality motivation and engagement in physical



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education are enhanced through autonomy-supportive experiences that promote enjoyment and well-being (Standage *et al.*, 2025). In addition, meaningful physical education experiences are linked to positive emotions and sustained participation in physical activity (Beni *et al.*, 2017). Recent evidence also shows that enjoyment significantly predicts sustainable physical activity participation among university students (Zhang & Su, 2026). These findings suggest that enjoyable and inclusive activities reduce anxiety and encourage continued engagement in physical activity.

No significant differences were found when respondents were grouped according to age, gender, and prior playing experience, indicating that FunEBall appeals broadly across student characteristics. This finding contrasts with studies reporting that gender factors may influence students' physical activity levels and attitudes toward Physical Education (Limbo-Rivera, 2026), suggesting that FunEBall may reduce common participation gaps across demographic groups. This supports evidence that inclusive physical education environments promote equitable participation across diverse learners (Lonsdale *et al.*, 2013). However, significant differences emerged across year levels, particularly between first-year and second-year students. These may reflect differences in adaptation and perceived competence influenced by academic exposure. Similar findings show shifts in student experiences from first to second year in collaborative learning contexts (Vogel *et al.*, 2025), while first-year students are generally more receptive to interactive approaches than senior students (Headrick *et al.*, 2021).

The reliability analysis further strengthens the credibility of the findings. The overall Cronbach's alpha of .971 and high item-total correlations indicate that the FunEBall Student Feedback Survey is a dependable instrument for measuring student perceptions. This is consistent with evidence that strong internal consistency ($\alpha \geq .70$) reflects dependable measurement in educational research (Tavakol & Dennick, 2011). Likewise, validated scale development studies emphasize that strong item-total correlations indicate construct stability and suitability for use in similar contexts (Boateng *et al.*, 2018). This suggests that the FunEBall instrument is psychometrically sound and may be further validated or applied in comparable physical education settings.



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An important contribution of the qualitative phase was the identification of practical improvements not fully captured in the survey data. Although students were generally satisfied, they recommended clearer rules, larger playing areas, longer play time, improved strategic instruction, balanced team composition, and motivational elements. Literature supports that effective game-based learning requires clear rules and well-structured mechanics to ensure meaningful engagement (Camacho-Sánchez *et al.*, 2023). Likewise, gamification enhances motivation and participation when properly designed (Ferraz *et al.*, 2024), while tactical game-based models emphasize rule modification, space adjustment, and team balancing to improve learning outcomes (Wang *et al.*, 2024).

Taken together, the findings demonstrate that FunEBall is an effective innovation in physical education that promotes engagement, learning, fitness, enjoyment, and inclusivity. The convergence of quantitative and qualitative evidence supports the value of game-based and student-centered approaches in enhancing motivation, participation, and learning outcomes in physical education settings (Camacho-Sánchez *et al.*, 2023). In addition, evidence shows that well-designed game-based learning environments significantly improve student engagement and achievement across educational contexts (Ezeddine *et al.*, 2025). Furthermore, systematic research confirms that game-based physical education programs consistently enhance enjoyment, participation, and positive learning experiences among learners (Mo *et al.*, 2024). These findings reinforce the potential of innovative and inclusive pedagogies to improve the quality of physical education delivery.

Conclusion

Respondents were primarily young adults representing different year levels, with a slightly higher proportion of females and more participants having prior experience with FunEBall. These characteristics provided a diverse sample for examining students' perceptions the activity within a university physical education context.

Students reported very positive perceptions of FunEBall across the dimensions of engagement and participation, learning outcomes, physical activity and fitness, and enjoyment and perception. These findings provide preliminary evidence that FunEBall is a well-received



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physical education activity with educational potential to support active participation, skill development, teamwork, and positive learning experiences. However, these results should be interpreted in light of the study's methodological limitations, including the small purposive sample and the absence of a control group.

The analysis further revealed no significant differences across most demographic variables, including age, gender, and prior experience, suggesting that students generally reported similar perceptions of FunEBall regardless of these characteristics. In contrast, significant differences were consistently observed across year levels, and the large effect sizes suggest that these differences were not only statistically significant but also practically meaningful. The supplementary nonparametric analyses supported the robustness of these findings despite the unequal group sizes. These results suggest that students' academic exposure and progression may influence their perceptions of FunEBall, with lower-year students potentially benefiting from additional orientation and confidence-building during its implementation.

The high Cronbach's alpha coefficient demonstrated excellent internal consistency, indicating that the FunEBall Student Feedback Survey was a reliable instrument for assessing student perceptions across the measured constructs.

The qualitative findings enriched these results by showing that students experienced FunEBall as fun, collaborative, motivating, and less intimidating than traditional sports, while also identifying areas for improvement such as clearer rules, better facilities, longer play time, and enhanced strategic instruction.

Overall, the integration of the quantitative and qualitative findings suggests that FunEBall is a well-received and innovative physical education activity with promising educational potential. While the findings support its acceptability among university students, further research involving larger and more diverse samples, multiple institutions, and experimental or quasi-experimental designs is needed before drawing broader conclusions regarding its effectiveness or wider curricular integration.



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Limitations of the Study

Despite its contributions, this study has several limitations. First, the study involved a relatively small sample of *60 respondents* from a single university, which may limit the generalizability of the findings to other higher education institutions and student populations. Second, the use of *purposive sampling* may have introduced selection bias, as only students who participated in the FunEBall intervention were included in the study. Third, the study *did not include a control or comparison group*, limiting the ability to attribute the observed perceptions solely to the implementation of FunEBall or to draw causal inferences regarding its educational effectiveness. Fourth, the findings relied primarily on *self-reported perceptions*, which may have been influenced by *social desirability bias*, response bias, or participants' subjective interpretations of their experiences. Fifth, the study focused on the *short-term implementation* of FunEBall and immediate student feedback; therefore, its long-term effects on physical fitness, skill retention, motivation, and learning outcomes were not examined. Sixth, the *qualitative data were collected through open-ended survey questions* rather than in-depth interviews or focus group discussions, which may have limited the depth and richness of the participants' perspectives. Finally, although one of the authors is the inventor of FunEBall, measures were implemented to promote objective data collection, analysis, and interpretation. Nevertheless, this relationship may be perceived as a potential source of bias.

Recommendations for Future Research

Future research should involve *larger and more representative samples* drawn from *multiple higher education institutions* to improve the generalizability of the findings. Researchers are encouraged to employ *experimental, quasi-experimental, or longitudinal research designs*, including appropriate control or comparison groups, to examine the effectiveness and long-term educational outcomes of FunEBall. Future studies may also compare FunEBall with traditional physical education activities and incorporate *objective measures* of physical fitness, motor skill development, and student performance alongside self-reported perceptions. In addition, the use of *in-depth interviews or focus group discussions* is recommended to gain a deeper understanding of students' experiences, perceptions, and



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implementation strategies. Finally, conducting studies led by *independent researchers* would further strengthen the evidence base and enhance the credibility and external validity of the findings.

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