

Prioritizing Quality Improvement in Pickleball Physical Education at the University of Economics Ho Chi Minh City

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Abstract. This study translated student-satisfaction findings into an ordered quality-improvement agenda for Pickleball physical education at the University of Economics Ho Chi Minh City. A secondary analysis was conducted using aggregate results from the university-funded project CS-2025-12, which involved 20 experts and 200 students. Four quality dimensions were examined: facilities and equipment, teaching staff, curriculum content, and perceived value. A performance gap from the maximum scale score was weighted by expert agreement to produce a Consensus-Weighted Gap Index. Facilities and equipment accounted for 32.8% of total improvement priority, followed by curriculum content (24.5%), perceived value (21.9%), and teaching staff (20.8%). Adjusting the index for response dispersion did not alter the ranking. The agreement-performance matrix identified facilities as the only dimension with high expert consensus and student satisfaction below the overall benchmark. The findings support a sequenced improvement strategy that protects instructional strengths while addressing capacity and curriculum constraints. The proposed index is a planning heuristic based on aggregate data and should not be interpreted as a causal or cost-effectiveness estimate.

Keywords: Pickleball; physical education; student satisfaction; improvement priority; secondary analysis.

1. INTRODUCTION

University physical education must satisfy curricular requirements while encouraging students to remain physically active over time. Vietnam's Decree No. 11/2015/ND-CP and Decision No. 1076/QĐ-TTg require educational institutions to improve instruction, diversify sports activities, and provide suitable facilities and equipment. Conclusion No. 70-KL/TW further emphasizes healthy lifestyles, wider access to physical activity, and better school sport. Introducing a new sport therefore requires more than opening classes. Universities also need to monitor students' experience and convert their feedback into an ordered improvement plan.

Pickleball can be organized for singles or doubles and requires hand-eye coordination, short-distance movement, and frequent interaction between players. These features suit a university setting in which students seek physical activity, social contact, and stress relief. Demand, however, can grow faster than the supply of courts, equipment, and class periods. A high overall satisfaction score may then conceal a component that is becoming a constraint. The World Health Organization (2022) likewise indicates that policies promoting physical activity must address access, supportive environments, and program sustainability together.

University project CS-2025-12 identified four dimensions of UEH students' satisfaction with Pickleball and described their ratings. Its descriptive analyses reported the dimensions, satisfaction levels, and differences

among selected student groups. For program management, three questions remained: which dimension should be improved first, how large the relative priorities are, and whether the ranking remains stable after response dispersion is considered. These questions differ from describing satisfaction levels.

Service-quality models emphasize users' perceptions in quality assessment (Parasuraman et al., 1988), whereas performance-based approaches focus directly on the experience reported by users (Cronin & Taylor, 1992). Perception scores alone, however, do not produce an order for action. A prioritization tool must combine current performance with evidence that a dimension warrants attention in the specific setting.

Importance-performance analysis is commonly used to convert user ratings into management priorities (Martilla & James, 1977). The project dataset did not directly measure importance as rated by students, so the present study did not apply a conventional importance-performance matrix. Instead, expert agreement was used cautiously as an indicator that a dimension warranted attention, while the distance between satisfaction and the scale maximum represented room for improvement. The study aimed to develop and apply a Consensus-Weighted Gap Index, test the ranking after adjustment for the coefficient of variation, and propose an improvement roadmap consistent with the results.

2. METHODS

2.1. Study design and data source

This study conducted a secondary analysis of aggregate results from the university research project entitled Student Satisfaction with Pickleball in the Physical Education Program at the University of Economics Ho Chi Minh City, code CS-2025-12. The project surveyed 20 experts to assess the relevance of the proposed dimensions and 200 students using a five-point Likert scale. The present analysis used only results aggregated across four dimensions and did not access identifying records or individual responses.

Four inputs were available for each dimension: expert agreement, mean satisfaction, standard deviation, and coefficient of variation. Scales in the project report had Cronbach's alpha coefficients ranging from 0.782 to 0.854. Alpha was treated as evidence of internal consistency among indicators, not as sole evidence of construct validity (Cronbach, 1951). Factor analysis was not repeated because the secondary analysis did not include an individual-level data matrix.

2.2. Development of the priority index

For each dimension i , mean satisfaction was denoted by P_i on a scale from 1 to 5, expert agreement by E_i , and the coefficient of variation by CV_i . The performance gap was calculated as $G_i = 5 - P_i$. The Consensus-Weighted Gap Index was defined as $C_i = (E_i/100) \times G_i$. The priority share for dimension i was $W_i = 100 \times C_i / \sum C_i$. W_i is not a mandatory budget share; it is a conventional score for comparing the relative improvement effort across the four dimensions.

Two internal thresholds were used to construct the agreement-performance matrix. The agreement threshold was the mean of the four expert-agreement percentages, or 95%. The performance threshold was the project's overall satisfaction score, or 4.18. These sample-based thresholds support relative classification within the program and do not establish a quality standard for other institutions.

2.3. Stability analysis

A sensitivity analysis examined whether the ranking depended excessively on mean scores. A dispersion-adjusted index was calculated as $C_i^* = C_i \times (1 + CV_i)$, with CV_i expressed as a decimal. A dimension with more dispersed responses received a small increase in priority because uneven experience may signal an access or organizational problem. The result was considered stable when the ranking of all four dimensions remained unchanged between C_i and C_i^* .

2.4. Interpretation and ethics

The analysis ranks improvement priorities and does not infer causal relationships between the quality dimensions and overall satisfaction. Expert agreement is a proxy for salience, not a student-rated importance score. The study used aggregate data, processed no personal information, and created no additional contact with participants. Data reuse is disclosed in the acknowledgments and data-source statement so that the article can be traced to the university project.

3. RESULTS

3.1. Input profile and performance gaps

Expert agreement ranged from 90% to 100%, indicating that all four dimensions were clearly relevant to course quality. Mean satisfaction ranged from 3.92 to 4.35. Facilities and equipment had the largest performance gap, 1.08 points, approximately 1.66 times the 0.65-point gap for teaching staff. Facilities and equipment also had the highest coefficient of variation, 19.1%, indicating greater unevenness in students' experience.

Table 1. Input data and performance gaps by quality dimension

Code	Quality dimension	Agreement (%)	P_i	SD	CV (%)	G_i
FE	Facilities and equipment	95	3.92	0.75	19.1	1.08
TS	Teaching staff	100	4.35	0.52	11.9	0.65
CC	Curriculum content	90	4.15	0.58	13.9	0.85
PV	Perceived value	95	4.28	0.61	14.2	0.72

Note: P_i is mean satisfaction; $G_i = 5 - P_i$. Source: calculations from aggregate results of project CS-2025-12.

3.2. Improvement priorities

After the performance gap was weighted by expert agreement, facilities and equipment had the highest C_i value, 1.026, and accounted for 32.8% of total improvement priority. Curriculum content ranked second at 24.5%. Perceived value and teaching staff accounted for 21.9% and 20.8%, respectively. The 8.4-percentage-point difference between the two leading priorities indicates that court and equipment capacity should be addressed before, or at least alongside, curriculum adjustment.

Table 2. Consensus-Weighted Gap Index

Rank	Code	Quality dimension	C_i	W_i (%)	W_i^* (%)
1	FE	Facilities and equipment	1.026	32.8	33.9
2	CC	Curriculum content	0.765	24.5	24.2
3	PV	Perceived value	0.684	21.9	21.7
4	TS	Teaching staff	0.650	20.8	20.2

Note: W_i is the base priority share; W_i^ is the share after adjustment for the coefficient of variation.*

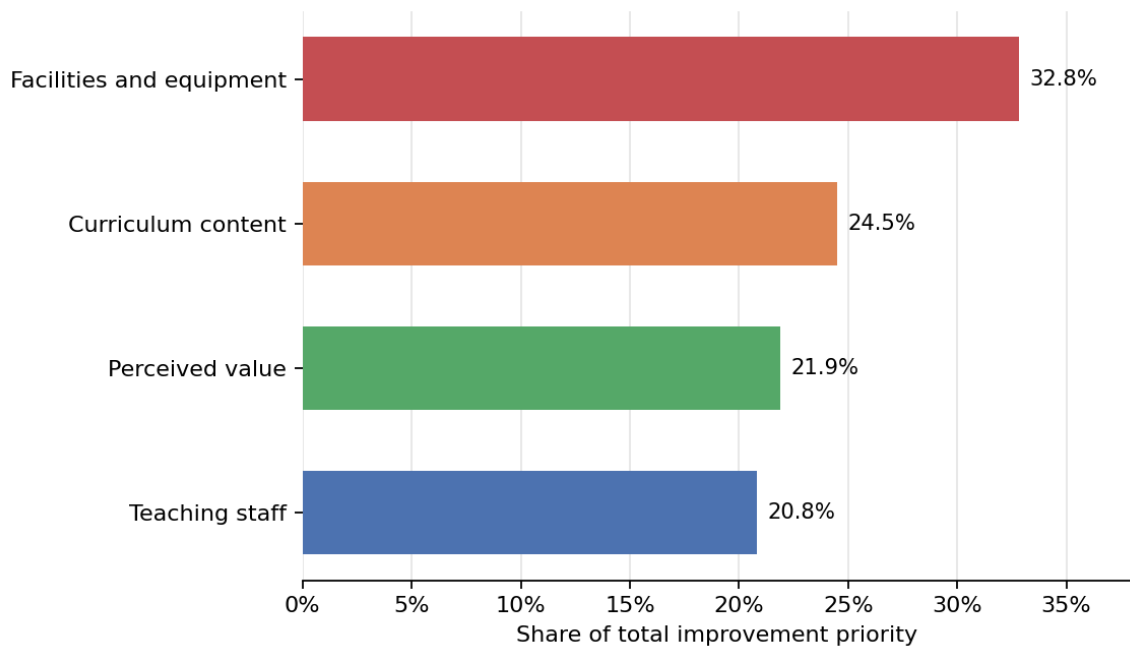


Figure 1. Share of total improvement priority by quality dimension

3.3. Agreement-performance matrix

The matrix placed facilities and equipment as the only dimension with high agreement but performance below the overall benchmark. This is the clearest priority signal because both sources of information converge: experts considered the dimension relevant, while students rated it below the other dimensions. Teaching staff and perceived value fell in the maintain-strengths area. Curriculum content had satisfaction below 4.18 and expert agreement below the 95% mean, supporting selective improvement rather than wholesale curriculum redesign.

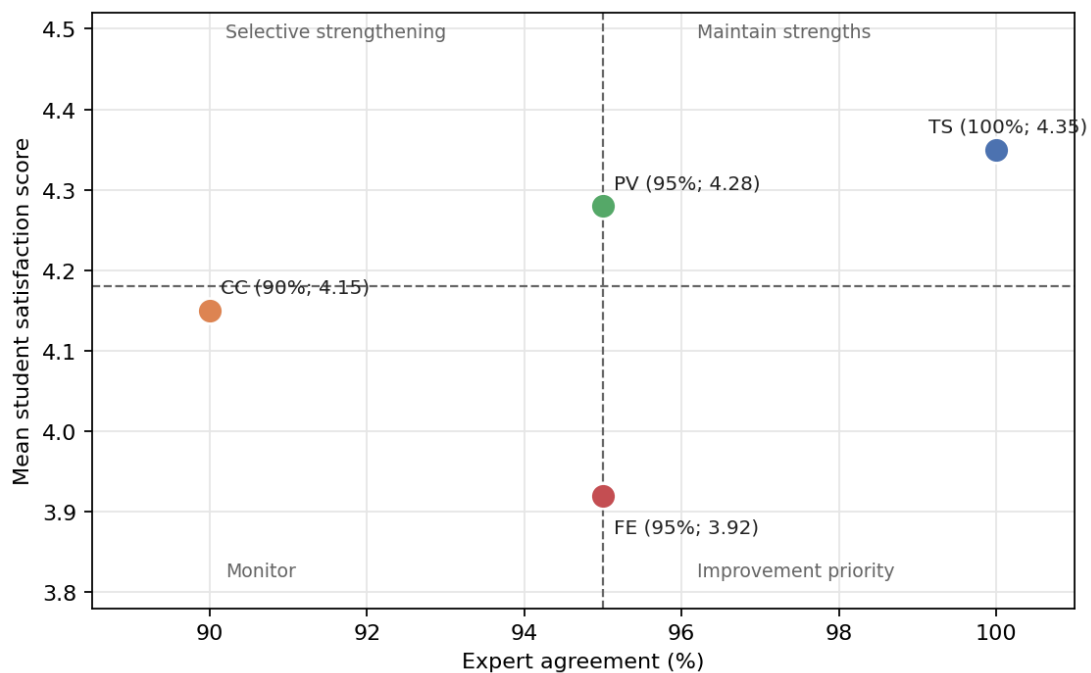


Figure 2. Expert agreement and student performance matrix

Table 3. Management interpretation of matrix positions

Dimension	Matrix position	Management implication
FE	High agreement, below-benchmark performance	Prioritize court and equipment capacity and improve timetable coordination
CC	Below-mean agreement and below-benchmark performance	Selectively review lesson structure and ability-level progression
PV	High agreement, above-benchmark performance	Maintain health, social, and positive-experience benefits
TS	High agreement, above-benchmark performance	Preserve teaching quality and provide periodic professional updates

3.4. Sensitivity analysis

After the coefficient of variation was added to the index, facilities and equipment increased from 32.8% to 33.9% of total priority. Curriculum content accounted for 24.2%, perceived value for 21.7%, and teaching staff for 20.2%. The ranking did not change. The priority assigned to facilities therefore reflects both its lower mean and its greater response dispersion. The adjustment is only a stability check; it does not identify the causes of differences among student groups or teaching locations.

4. DISCUSSION

4.1. From satisfaction scores to improvement decisions

The overall satisfaction score of 4.18 out of 5.0 indicates positive reception, but an aggregate score does not directly guide resource allocation. The results show that the program still requires relative priorities among its components. This approach follows the logic of importance-performance analysis, in which a dimension that warrants attention but has lower performance should be reviewed first (Martilla & James, 1977). The present study does not label unmeasured data as importance; expert agreement serves only as a weight for salience. The C_i index also addresses a limitation of ranking dimensions by means alone. Satisfaction scores place facilities last and teaching staff first, but they do not quantify the difference in improvement priority. After transformation, facilities account for nearly one-third of the conventional total improvement effort. This share does not estimate investment costs, but it helps managers avoid allocating equal attention when improvement needs differ.

4.2. Facilities as the constraint during expansion

Facilities and equipment produced three concurrent signals: the lowest mean, the largest gap, and the highest coefficient of variation. In a sport that requires dedicated courts and equipment, capacity affects ball contacts, practice time, and class organization. If enrollment grows without a proportional increase in court space and equipment sets, strong instruction may not translate into a consistent student experience. Short-term action should therefore begin with an audit of court use by time period, students per court, serviceable paddles and balls, and actual practice time per student.

New construction is not the only option. The Physical Education Center can reschedule classes to reduce peak-hour concentration, organize off-court skill stations, rotate groups, and standardize equipment lending and return. These operational measures should be assessed before fixed infrastructure is expanded. If capacity data show persistent overcrowding, investment in courts and equipment will have a clearer basis.

4.3. Selective curriculum improvement

Curriculum content ranked second even though satisfaction remained above 4.0. This finding supports a review of components that directly affect active time and ability-level fit, rather than a complete redesign. A

beginner curriculum should provide adequate time for the serve, return, dink, volley, movement, and non-volley-zone rules, together with controlled match play that allows students to apply those skills (Tô Thị Hương et al., 2025). Ability-based progression can reduce overload among beginners and insufficient challenge among students with a sports background.

Monitoring indicators should refer to observable behavior: the proportion of active time during class, technical practice repetitions per student, skill attainment against a rubric, participation in intramural play, and intention to continue after the course. These measures would move program monitoring beyond general perceptions toward process quality.

4.4. Preserving teaching quality and perceived value

Teaching staff ranked last in improvement need, but this does not imply low importance. Expert agreement reached 100% and satisfaction reached 4.35, identifying teaching as a strength to preserve. Resources should support periodic updates in rules, technique, exercise safety, and large-class organization instead of replacing an instructional system that students rate positively. Teaching quality is also necessary for investments in facilities to produce learning benefits.

Perceived value was above the benchmark and had high expert agreement. The university can reinforce this dimension through extracurricular sessions, intramural tournaments, and opportunities to practice after the course. Current data, however, represent student perceptions and do not directly measure changes in fitness, physical activity, or mental health. Future studies should use pre-post indicators and standardized instruments before drawing conclusions about health effects.

4.5. Implementation roadmap and monitoring indicators

The priority ranking supports a three-stage roadmap. The first stage addresses capacity and operational data. The second adjusts curriculum content in response to monitoring results. The third expands extracurricular value while maintaining teaching standards. This sequence avoids expanding participation before the conditions for regular classes are stable.

Table 4. Roadmap for improving Pickleball course quality at UEH

Period	Focus	Main actions	Monitoring indicators
0-6 months	Facilities and operations	Audit court capacity; review schedules; standardize lending and return; determine students per court	Capacity by period; practice time; proportion of serviceable equipment
6-12 months	Curriculum content	Use ability-based progression; balance technique and match play; develop skill and safety rubrics	Active-time share; practice repetitions; rubric attainment; satisfaction by class
12-24 months	Value and quality maintenance	Expand suitable extracurricular activities; develop staff; repeat the survey	Voluntary participation; intention to continue; satisfaction and response dispersion

4.6. Contributions and limitations

The study's main contribution is a new analytical product from the project data: a ranking and proportional distribution of improvement priorities rather than another description of satisfaction. The formula is transparent, easy to calculate, and can be updated after a new survey cycle. Disclosure of the data source, project code, and interpretive limits makes the article clearly traceable to the university-funded research product.

The study has four limitations. First, expert agreement is not a direct measure of importance to students. Second, aggregate data do not permit measurement-model testing, regression analysis, or adjustment for teaching location, timetable, and sports experience. Third, the index depends on the five-point ceiling and the

internal threshold of 4.18, so it should not be compared directly with another program. Fourth, the priority shares do not account for cost, implementation time, or the marginal effectiveness of each option. Capacity, cost, and learning-outcome data should be added before major investment decisions.

5. CONCLUSIONS AND RECOMMENDATIONS

Secondary analysis of project CS-2025-12 identified facilities and equipment as the leading improvement priority for Pickleball at UEH, accounting for 32.8% of total priority. Curriculum content ranked second at 24.5%, followed by perceived value at 21.9% and teaching staff at 20.8%. The ranking remained unchanged after adjustment for response dispersion. The university should first address the supply of courts, equipment, and class periods; then selectively review course structure; and preserve teaching quality and the positive values reported by students.

The Physical Education Center should establish a capacity dashboard by teaching location and time period, measure students' actual practice time, and repeat the survey after one improvement cycle. The next survey should add a student-rated importance scale, skill-outcome indicators, and cost data. When individual-level data become available, the measurement model and relationships between quality dimensions and overall satisfaction should be tested with an appropriate method.

6. ACKNOWLEDGMENTS

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7. DATA SOURCE AND ANALYTIC DISTINCTIVENESS

The analysis uses aggregate results reported in project CS-2025-12 and no personally identifiable data. The article addresses improvement priorities and derives new indices; it does not repeat analyses of gender, year of study, or the original descriptive objective of measuring satisfaction.

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