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STAD STRATEGY: A COOPERATIVE TEACHING APPROACH ON FUNDAMENTAL BADMINTON COMPETENCIES IN TEACHER EDUCATION

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ABSTRACT

Footwork is among the most difficult badminton skills for students to learn, and traditional, teacher-centered instruction may not give learners enough repetition, feedback, and guided practice. Cooperative learning, such as the Student Teams-Achievement Division (STAD), is a promising alternative, but its use for teaching fundamental badminton footwork in tertiary education, particularly in the Philippines, remains underexplored. This study examined the effectiveness of STAD in teaching four fundamental badminton footwork skills (stance, split step, lunge, and chasse step) to PATHFit 3 students of the College of Teacher Education at North Eastern Mindanao State University during Academic Year 2025–2026, as the basis for an Enhanced Instructional Module. A quantitative, single-group pretest–posttest design was used. Fifty students (12 male, 38 female) from two blocks were selected by convenience sampling and took part in a four-week intervention (pre-test, STAD-based lecture and group discussion, group drills and practice with feedback, post-test). Performance was rated with a four-point performance rubric. Data were analyzed using frequencies, percentages, weighted means, standard deviations, and the paired-samples *t*-test with effect sizes. The overall pre-test weighted mean was 1.70 (*SD* = 0.59; Poor), and no student reached Very Good in the chasse step. After the intervention, the overall weighted mean rose to 3.67 (*SD* = 0.33; Very Good), with no student in the Fair or Poor categories for any skill. Improvements were statistically significant for all four skills (all $p < .001$; mean differences 1.73–2.18; Cohen's $d = 2.51–3.32$). The split step, the weakest skill at baseline (1.55), showed the greatest gain. Basic footwork performance improved markedly after STAD-based instruction, and the gains are consistent with the collaboration, teamwork, active participation, and shared learning that STAD encourages. Because the study had no control group, the improvement cannot be attributed to STAD alone. Teachers are encouraged to continue using STAD and to provide additional training sessions and targeted feedback to help students master more complex skills; future studies should use controlled designs and examine long-term retention and other sports in the physical education curriculum.

Keywords: *STAD Strategy, Cooperative Learning, Basic Footwork, Badminton, Physical Education, PATHFit (Physical Activities Towards Health and Fitness), Quantitative Research*

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INTRODUCTION

Background and Rationale

Badminton is one of the most popular sports in physical education (PE) classes, yet many students struggle to develop their skills in it because they lack proficiency in basic skills such as grip, footwork, service, and stroke technique. Instructors regard it as essential to build students' confidence and decision-making abilities and to enhance their overall enjoyment of badminton, beyond performance, in addition to developing physical skills (Farrel et al., 2023). When students do not master these basic skills, they may become frustrated and less engaged and may be unable to develop higher-order skills and strategies, which could ultimately lead to an aversion to lifelong physical activity (Patel & Sharma, 2024).

Footwork comprises the basic movement skills that determine the speed and accuracy with which a player reaches the shuttlecock; these include the lunge, split step, chasse step, and stance. Poor footwork can affect shot making, court coverage, positioning, and timing and, eventually, reduce shooting performance (Wang et al., 2024; Yu et al., 2022). Footwork training has been examined in relation to agility and balance among badminton players (Rathod et al., 2023; Slamet et al., 2022; Wong et al., 2019), and badminton skill development more broadly has been studied through modified curricula (Wang et al., 2025), multimedia-supported teaching (Lian, 2022), and attributes such as concentration, eye coordination, and agility (Donie et al., 2023) and reaction time (Sukmooncharen et al., 2022).

Footwork is also one of the most difficult badminton abilities for students to learn. Many students find it hard to regulate their movements effectively, which makes it difficult for them to maintain balance, move in the correct direction on the court, see the shuttlecock, and respond quickly to its direction. In Philippine PE classes, students often have less badminton experience than students from other countries; they lack confidence, and their performance suffers because they do not fully understand the correct technique and movement patterns. Most badminton practical classes (Malwanage et al., 2022; Son, 2023) have been conducted with traditional teaching methods that rely mainly on lectures and repetitive practice, which may not be efficient enough to meet students' varied learning needs.

The primary challenge in teaching badminton is that students are often not actively involved in practice. Many teachers use teacher-centered approaches, few include collaborative learning tasks, and few provide close student contact, which restricts opportunities to learn meaningful skills and to receive meaningful feedback. This not only slows the development of badminton skills but also hinders growth in interpersonal skills, teamwork, and communication. Students may become passive learners, which can impede the development of proper movement patterns, and they may be slow to acquire skills because they do not receive enough repetition, feedback, and guided practice to learn appropriate footwork.

The Student Teams-Achievement Division (STAD) is a cooperative learning strategy developed by Robert Slavin that emphasizes group achievement, individual accountability, teamwork, and peer support (Slavin, 2010, 2011). This structured pedagogical approach promotes learning through collaboration and mutual support among students in small, heterogeneous groups. It enables learners to engage actively in the learning process, deepen their understanding through peer interaction, and improve both academic performance and skill development. Slavin (1995) emphasized that STAD has a positive effect on academic performance because it promotes collaborative learning in which responsibility for the learning process is shared among team members. Similarly, Johnson et al. (2009) argued that cooperative learning strategies such as STAD significantly enhance students' academic achievement while also improving social interaction, communication, and teamwork skills. STAD has been applied in subjects such as biology (Chophel et al., 2023), mathematics for vocational–technical engineering students (Ziziumiza et al., 2022), and vocational high school instruction (Yeni et al., 2023).

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Team-based cooperative learning can also help students develop socio-emotional skills such as self-control, cooperation, and self-esteem (Suryadi et al., 2024), which is why cooperative learning is considered an essential instructional approach across learning contexts. However, its application to developing fundamental badminton footwork competencies remains underexplored and insufficiently examined, and previous studies of the efficacy of STAD in improving footwork among tertiary students are limited. Although Yang et al. (2021) explored the effectiveness of cooperative learning strategies such as STAD in improving badminton skills and other PE activities, most research has focused on service techniques or general sports skills. Few studies have examined the use of the STAD approach to teach basic badminton skills, particularly in the Philippine context. Further study is therefore needed to determine how STAD can improve students' mastery of fundamental badminton footwork skills.

This study therefore examined whether STAD is effective in improving the fundamental footwork skills of tertiary students in badminton, and it discusses the findings in light of the expected effects of cooperative learning on students' performance, engagement, and drive to learn correct footwork movement patterns. The study addresses gaps in teaching pedagogy by offering concrete insights that can help teachers improve their strategies and create more accessible learning experiences and professional growth in higher education. It also offers feasible recommendations for educators, coaches, and administrators in PE on designing an outcomes-based curriculum through an Enhanced Instructional Module that supports students' engagement in physical activity and nurtures their badminton skills.

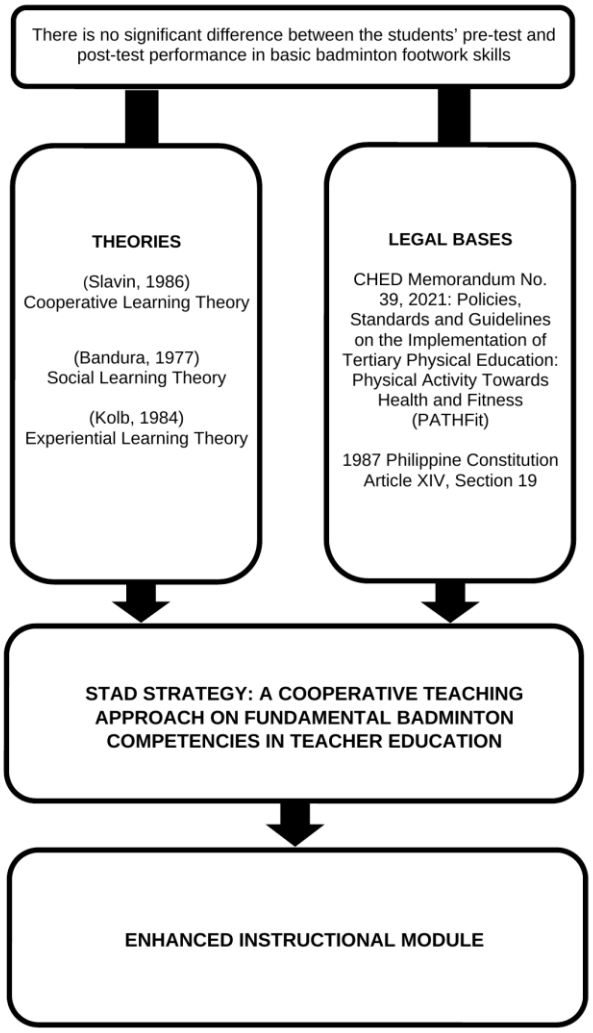
Theoretical Framework

This study assumes that implementing STAD enhances the footwork skills of second-year Teacher Education students who are about to enroll in PATHFit 3. Its assumptions are anchored on three theoretical foundations—Cooperative Learning Theory (Slavin, 1986), Social Learning Theory (Bandura, 1977), and Experiential Learning Theory (Kolb, 1984/2014)—and on two legal bases: CHED Memorandum Order (CMO) No. 39, series of 2021, which sets policies, standards, and guidelines for implementing tertiary PE through Physical Activity Towards Health and Fitness (PATHFit), and Article XIV, Section 19 of the 1987 Philippine Constitution (Figure 1).

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Figure 1. **Theoretical and Conceptual Framework of the Study**



Cooperative Learning Theory

Cooperative Learning Theory was developed by Slavin (1986), who highlighted that skills are learned most effectively when they are practiced collaboratively rather than through individual competition. Core components of cooperative learning in this tradition include (a) positive interdependence, in which each member of the group works together to learn a given skill; (b) individual accountability, in which members take ownership of and responsibility for reaching the joint goals; (c) equal participation, in which all team members have the same opportunities to grow and learn; and (d) group processing, in which the group discusses, brainstorms, and reflects on how to improve its cooperation and effectiveness. The theory further holds that when students cooperate and participate actively, cognitive skills and interpersonal relationships improve, which in turn promotes a cooperative and motivating classroom environment.

To increase the effectiveness of cooperative learning, attention has been focused on the variables that mediate the relationship between positive interdependence and desired outcomes, such as greater learning and retention of

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academic material and positive relationships among diverse students (Johnson & Johnson, 2008). Adopting a shared approach can be difficult at first because it requires initial thought, long-term vision, and persistence; students are often unfamiliar with, or unskilled at, working together. Fortunately, cooperative learning studies allow new users to learn from educators' trial-and-error and effective practices (Jacobs, 2004).

Social Learning Theory

Social Learning Theory holds that new patterns of behavior can be acquired through direct experience and through observation of peers' behavior (Bandura, 1977). Observational learning is described as proceeding through four processes: attention, retention, reproduction, and motivation (Horsburgh & Ippolito, 2018). The theory sees much of human behavior as learned from the social environment; traditional concepts of learning are enhanced by the principles of vicarious learning, and together they provide a mechanism for transmitting information from the environment to the individual, who processes it cognitively (Leonard & Blane, 1999). The same ideas are also framed as social cognitive theory (Schunk, 2012).

Learning takes place in a social setting through observation, but it also involves mental processes: learners internalize and make sense of what they observe in order to reproduce the behavior themselves (Horsburgh & Ippolito, 2018). Teachers accordingly attempt to develop character by integrating values into their subjects, and they model personality and pedagogical competencies that promote better learning (Khozin et al., 2024).

Experiential Learning Theory

Experiential Learning Theory holds that learning is the process by which knowledge is created through the transformation of experience (Kolb, 1984/2014), and it emphasizes several essential aspects of the learning process from an experiential perspective. Experiential learning has also been linked to the transfer of knowledge to students (Tiţă et al., 2025; see also Lehane, 2025). In the transformation phase, the reflective observation stage tends to involve observing others who are engaged in the experience and considering what happens, whereas the active experimentation stage favors jumping in and starting to apply what has been learned (McCarthy, 2010).

Learners are unique in the way they learn, yet they contribute equally to a larger, holistic learning cycle that recognizes, acknowledges, and includes all ways of knowing (Rainey & Kolb, 1995). In cooperative groups, members work toward a common goal while differing from one another in every other dimension (Slavin, 1982). In this regard, Kolb (2011) concluded that students in an experiential learning classroom may develop a better understanding of concepts and retain knowledge more effectively than students in a lecture class.

The three theories were grounded in this study, examined in relation to the students' learning process, and considered essential to integrated development. Learning basic footwork skills can be challenging for some students because of the technical demands involved, but creative teaching methodologies can improve it and accommodate diverse learning styles. In the field of PE, where teachers are known to be flexible, they can design an Enhanced Instructional Module in accordance with the newly implemented CMO No. 39, series of 2021, and Article XIV, Section 19 of the 1987 Philippine Constitution.

Statement of the Problem and Research Questions

This study determined the effectiveness of the STAD strategy in teaching badminton competencies to PATHFit 3 students at North Eastern Mindanao State University (NEMSU), Tandag City, Surigao del Sur, during Academic Year 2025–2026, as the basis for developing an Enhanced Instructional Module. Specifically, it sought answers to the following questions:

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1. What is the pre-test performance of students in the following competencies: (1.1) stance, (1.2) split step, (1.3) lunge, and (1.4) chasse step?
2. After using the STAD strategy, what is the post-test performance of students in the abovementioned competencies?
3. Is there a significant difference between the pre-test and post-test performance of students in the aforementioned competencies?
4. Based on the findings, what enhanced instructional module can be presented?

Hypothesis

H_0: There is no significant difference between the pre-test and post-test performance of students in the aforementioned badminton footwork skills.

Significance of the Study

The output of this study is expected to benefit the following:

School administrators. The study will help administrators recognize the importance of teaching basic footwork skills, particularly in badminton, and sustain collaboration and socialization to achieve joint goals.

Physical education teachers. The study will help PE teachers motivate themselves to prioritize the modification and innovation of educational techniques so as to move beyond the status quo in the field.

Students. The results will benefit students' enthusiasm for learning skills by integrating effective teaching strategies that promote collaboration, improve performance, boost self-esteem, and, most of all, apply shared knowledge to actual performance.

Future researchers. The study will serve as a reliable reference for reviewing pedagogical techniques that provide quality education to their clientele.

Researcher. The findings will help PE researchers support the goals of the Commission on Higher Education (CHED) by strengthening efforts to promote quality education.

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METHODS

Research Design

This study employed a quantitative approach to assess the efficacy of Slavin's (1980) STAD strategy in the PATHFit 3 program, specifically for basic footwork skills in badminton. A single-group pretest–posttest design was used: one group of students was assessed before and after the STAD-based intervention, and only quantitative data were gathered and analyzed. Pre-test and post-test performance assessments used a four-point rubric to assess respondents' proficiency in the basic skills (Espejon, 2024).

Flow of the Study

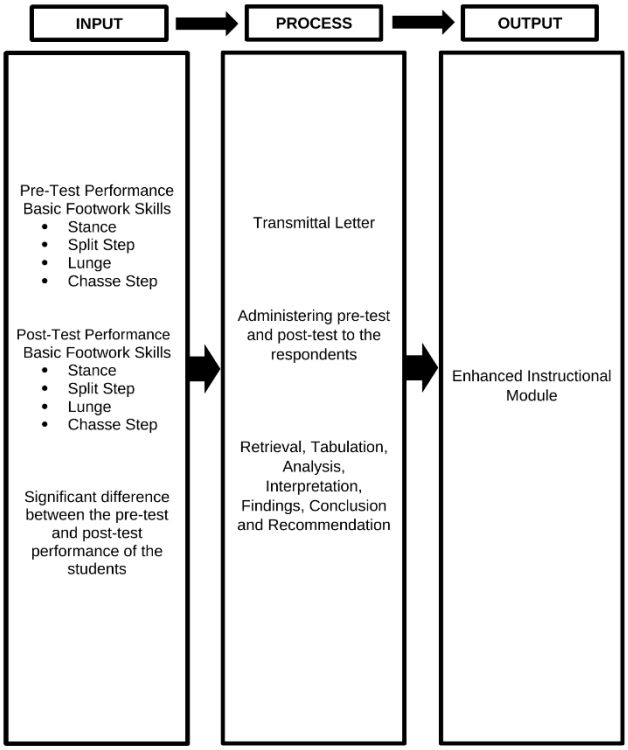
The study was conducted in three planned phases—input, process, and output (Figure 2).

Input. The input phase consisted of performance and improvement exercises and drills for the basic badminton footwork skills (stance, split step, lunge, and chasse step), together with numerical data on students' performance before and after the application of the Student Teams-Achievement Division strategy.

Process. A transmittal letter was sent to the Dean of the College of Teacher Education of NEMSU. After the dean's approval was received, the researcher began facilitating the sessions and collecting data. The gathered data were retrieved, tabulated, analyzed, discussed, and interpreted before the conclusions and recommendations were formulated.

Output. Based on the results, an Enhanced Instructional Module for basic skills—the types of badminton footwork—was developed in the third phase of the study using the STAD strategy.

Figure 2. **Flow of the Study**



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Research Environment

The study was conducted at North Eastern Mindanao State University (NEMSU), Tandag Campus, Tandag City, Province of Surigao del Sur, Philippines (Figure 3). The university traces its beginnings to 1982, when Bukidnon State University (formerly Bukidnon State College) established an extension campus in Tandag City, the Bukidnon External Studies Center (BESC). BESC initially served 153 pioneering students during Academic Year 1982–1983, with classes held regularly at Jacinto P. Elpa High School under the supervision of the late Rufina G. Luna, the first College Coordinator.

A major milestone in the development of education in Surigao del Sur was the establishment of the Surigao del Sur Polytechnic College (SSPC) through Republic Act (RA) No. 7377, signed into law on April 10, 1992, by the late President Corazon C. Aquino. The four DECS-supervised institutions in the municipalities of Tagbina, Cagwait, Lianga, and San Miguel, together with BESC in Tandag, worked together to reinforce the delivery of higher education in the entire province. SSPC was converted into a state college under RA No. 8628, passed on April 23, 1998, and renamed Surigao del Sur Polytechnic State College (SSPSC), with Dr. Antonio S. Ang appointed as its first College President. During that period, the Surigao del Sur Institute of Technology (SSIT) in Cantilan, Surigao del Sur, was amalgamated into SSPSC, extending its academic reach to the northern part of the province. Upon Dr. Ang's retirement in 2001, the late Dr. Remegita C. Olvida was elected by the Board of Trustees as the second president and was reappointed in 2003 and 2007.

The vision was realized in 2010 when SSPSC was officially converted into Surigao del Sur State University (SDSSU) through RA No. 9998, signed on February 22, 2010. The combined efforts of the academic community, stakeholders, CHED, and other regulatory bodies made this academic shift possible, and Dr. Olvida became the first president of the university. Dr. Baceledes R. Estal was appointed president by the Board of Regents in 2014 and retired after two terms in 2022; during his tenure, several campuses were institutionalized and infrastructure improved. In 2018, the University of Southeastern Philippines (USEP) signed a Memorandum of Agreement paving the way for the progressive transfer of its Bislig campus to SDSSU. This expansion led to the creation of the Bislig Campus, the university's seventh and last campus, located in the southern part of the country. The institution made further strides when RA No. 11584, passed on July 30, 2021, changed its name from SDSSU to North Eastern Mindanao State University (NEMSU).

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Figure 3. **Research Environment**



Participants and Sampling

The respondents were second-year students of the Teacher Education program in school year 2025–2026, drawn from two blocks. The first block (BEED-1B) comprised 29 students of the Bachelor of Elementary Education program (6 male, 23 female); the second (BSED-Science 1) comprised 21 students majoring in Science in the Bachelor of Secondary Education program (6 male, 15 female). In total, 50 students participated, of whom 12 (24%) were male, and 38 (76%) were female (Table 1). The majority of respondents were therefore female.

Table 1. **Distribution of Respondents**

Respondents	**BEED-1B**	**BSED-Science 1**	**Total**	**Percentage (%)**
Male	6	6	12	24
Female	23	15	38	76
Total	**29**	**21**	**50**	**100**

Convenience sampling, a non-random method that selects participants on the basis of their availability and willingness (Obilor, 2023), was applied. A total of 50 respondents from the College of Teacher Education at

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NEMSU who were enrolled in the PATHFit program took the pre-test and post-test on basic badminton footwork skills. This method was used intentionally because the respondents were accessible and relevant to the research objectives.

Eligibility criteria were set to determine study participants and to uphold their safety and welfare while maintaining the integrity of the findings. Inclusion criteria required valid informed consent, confirming that students were willing to take part after being oriented on the purpose, procedures, and potential risks and benefits of the study, and a medical certificate signed by a physician confirming their health status and fitness for physical activity. Exclusion criteria applied to students who were experiencing chronic conditions, persons with special abilities, and those with medical concerns that could be compromised during physical activity and for whom restrictions were stated in the medical certificate. Students who could not provide consent forms were informed that they would be excluded from the activity, since obtaining informed consent is an ethical requirement in research involving participants. Together, these criteria helped ensure that participants met the standard requirements, protected participants from potential harm, and supported the validity and reliability of the findings and research integrity.

Instrument

One instrument was developed for the study: the Performance Task Rubric. It is a teacher-made performance rubric used for both the pre-test and the post-test, with a four-point rating scale (Table 2). The scale ranges from Very Good (4, the highest rating; the student performs the skill with no errors), Good (3; 1–2 errors), and Fair (2; 3–4 errors) to Poor (1, the lowest rating; five or more errors). The rubric assesses the respondents' execution of the basic footwork skills: its first column lists the footwork skills to be performed together with the mechanics required to execute each skill, and the subsequent columns give the corresponding scores, specific technical descriptions, and the overall total score. Respondents were made aware of the rubric, including the categories and verbal interpretations, before the pre-test and post-test (Espejon, 2024).

Table 2. Four-Point Performance Rubric and Interpretation of Mean Scores

Score	Category	Mean score range	Verbal description (applied to each skill)
4	Very Good	3.26–4.00	The student performs the skill with no errors
3	Good	2.51–3.25	The student performs the skill with 1–2 errors
2	Fair	1.76–2.50	The student performs the skill with 3–4 errors
1	Poor	1.00–1.75	The student performs the skill with 5 or more errors

Note. The same descriptors were used for each of the four skills assessed: stance, split step, lunge, and chasse step (e.g., "The student performs the stance skill with no error").

Intervention and Data-Gathering Procedure

A transmittal letter addressed to the dean of the College of Teacher Education was submitted, requesting permission to conduct the study in the department. Data collection began after the researcher obtained the dean's approval and the respondents' consent. Data were collected over four weeks, with students meeting the researcher face-to-face once a week. The intervention drew on the features of STAD—group-based learning, a teacher presentation followed by team practice with peer feedback, individual assessment, and team recognition.

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Week 1: Pre-test and feedback. The researcher administered the pre-test, followed by a feedback session. Before the pre-test, students were asked about their prior experience in playing badminton and performed conditioning exercises to prevent muscle fatigue, injury, and cramps. Students were divided into groups of four to five, and each group was assigned a specific lane in which to perform the skills, which allowed the researcher to make the most of the remaining time for practice and feedback. Groups were called randomly, and each student was given five attempts to perform each of the four skills (stance, split step, lunge, and chasse step). Performances were observed and evaluated by invited PE instructors using the indicators of the performance rubric, and scores were recorded accordingly.

Week 2: STAD lecture and group discussion. The researcher used the STAD strategy to deliver a lecture and lead a group discussion on basic badminton footwork skills. This included discussion, demonstration, and guided interpretation of the lesson, including the step-by-step movement patterns necessary for accurate execution of the stance, split step, lunge, and chasse step.

Week 3: Drills, group practice, and feedback. Students were given the opportunity for active drills and training, followed by a period of practice to improve their skills and knowledge. Members of each group were given sufficient time to practice and perform the drills while applying the movement patterns demonstrated during instruction, with feedback from peers and the teacher.

Week 4: Post-test. The post-test was administered using the same set of activities and the same procedures as the pre-test, with all students in the same groups performing the required skills. Performances were evaluated by the researcher together with other PE instructors to ensure objective assessment and reliable results. The three groups that obtained the highest scores were recognized and awarded certificates in acknowledgment of their efforts and dedication. The researcher ensured that all data gathered were complete, kept private, and treated as confidential.

Data Analysis

Frequencies, percentages, weighted means, and standard deviations were computed to describe the respondents' pre-test and post-test performance in each skill. To determine the category of footwork skills before and after participation in the STAD strategy, the weighted mean was interpreted using the verbal categories in Table 2 (Very Good, 3.26–4.00; Good, 2.51–3.25; Fair, 1.76–2.50; Poor, 1.00–1.75). To test the hypothesis of a significant difference between pre-test and post-test performance, a paired-samples *t*-test (also called the dependent-samples *t*-test) was used. This test statistically compares the mean differences and standard deviations of two dependent groups (Kim, 2015) to ascertain whether students' skill performance before and after the intervention differs significantly (Engelmann et al., 1988). The significance level was set at $\alpha = .05$ ($df = 49$). Effect sizes were expressed as Cohen's *d* and interpreted as small (0.20–0.49), medium (0.50–0.79), large (0.80–1.29), or very large (1.30 and above).

Ethical Considerations

Participation was voluntary and required informed consent and a physician's medical certificate attesting to fitness for physical activity. Conditioning exercises preceded the performance tests to protect students from injury, and the data were kept complete, private, and confidential.

Operational Definitions

Key terms used in the study are defined operationally to provide a broader and better understanding of their use:

Badminton is an indoor racket sport taught in college that can be played by individual or paired players, using a racket and a shuttlecock as the main equipment.

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Badminton footwork is one of the basic skills in playing badminton: the specific set of steps a player executes to occupy the court efficiently and return the shuttlecock to the opponent's side.

Chasse step is a footwork skill in which one foot quickly follows the other in a smooth, sliding motion; it is a side-to-side step used to navigate the court while keeping balance and readiness to return a shot, for instance toward a forward position on the forehand side.

CMO is CHED Memorandum Order, specifically No. 39, series of 2021, used and adapted in tertiary education throughout the Philippines. It aims to reorganize the teaching context to enhance fundamental movement skills and progress toward applying them through participation in various sports events, including badminton.

Enhanced Instructional Module is the blueprint developed after the conduct of the study. It aims to determine whether modifications in teaching strategies can effectively improve students' learning.

Lunge is a deep, deliberate step taken to reach a shot, particularly one in the back or front corner. One leg steps forward and the front knee is deeply flexed while the back leg stays extended behind. For a right-handed player, the right leg is used and lands heel-to-toe; posture and balance are maintained, and the knee of the racket leg is aligned with the ankle.

PATHFit 3 is a prerequisite course and general education program in tertiary education, offered to enhance students' basic skills in various athletic and racket sports such as badminton. Students are taught the fundamentals and proper execution of skills, particularly badminton footwork, to prepare them for competition.

Stance is one of the basic footwork skills in badminton and the ready position that serves as the foundation before any movement. It begins with the feet shoulder-width apart, knees slightly bent, weight on the balls of the feet, and the upper body leaning slightly forward to maintain balance and readiness for movement in any direction.

Split step is a small hop or jump, made as the opponent touches the shuttle, from which the player pushes off in any direction. Both feet touch down together with the knees bent to maintain balance and allow quick movement toward the shuttle.

STAD (Student Teams-Achievement Division) is a cooperative learning strategy used in this study to promote students' participation, motivation, and peer collaboration, thereby enhancing fundamental motor skills and addressing learning gaps associated with student diversity.

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RESULTS

This section presents the descriptive findings on the respondents' pre-test and post-test performance, the test of the hypothesis, and the Enhanced Instructional Module developed from the findings. Both the strengths and the areas for improvement in students' skills are highlighted.

Pre-test Performance Before the STAD Strategy

Table 3 presents the distribution of the 50 respondents across the four performance levels, together with the weighted mean, standard deviation, and verbal interpretation for each skill.

Table 3. Pre-test Performance of the Respondents in the Basic Badminton Footwork Skills (N = 50)

Footwork skill	Very Good (4) 3.26–4.00	Good (3) 2.51–3.25	Fair (2) 1.76–2.50	Poor (1) 1.00–1.75	Weighted mean	*SD*	Level
Stance	3 (6.0)	5 (10.0)	12 (24.0)	30 (60.0)	1.79	0.71	Fair
Split step	1 (2.0)	3 (6.0)	10 (20.0)	36 (72.0)	1.55	0.57	Poor
Lunge	1 (2.0)	4 (8.0)	9 (18.0)	36 (72.0)	1.70	0.53	Poor
Chasse step	0 (0.0)	8 (16.0)	12 (24.0)	30 (60.0)	1.77	0.58	Fair
Overall					**1.70**	**0.59**	**Poor**

Note. Cells show frequency (percentage). Weighted mean levels: Very Good (3.26–4.00), Good (2.51–3.25), Fair (1.76–2.50), Poor (1.00–1.75). Frequencies are the number of students whose score for the skill fell within each range.

Stance. The majority of respondents (n = 30, 60.0%) were in the Poor range, followed by 12 respondents (24.0%) in the Fair range, 5 (10.0%) in the Good range, and 3 (6.0%) in the Very Good range. The weighted mean was 1.79 (SD = 0.71), interpreted as Fair.

Split step. Thirty-six respondents (72.0%) were in the Poor range, 10 (20.0%) in Fair, 3 (6.0%) in Good, and 1 (2.0%) in Very Good. The weighted mean was 1.55 (SD = 0.57), interpreted as Poor.

Lunge. Thirty-six respondents (72.0%) were in the Poor range, 9 (18.0%) in Fair, 4 (8.0%) in Good, and 1 (2.0%) in Very Good. The weighted mean was 1.70 (SD = 0.53), interpreted as Poor.

Chasse step. Thirty respondents (60.0%) were in the Poor range, 12 (24.0%) in Fair, and 8 (16.0%) in Good; no respondent reached Very Good. The weighted mean was 1.77 (SD = 0.58), interpreted as Fair.

Summary. Stance obtained the highest pre-test weighted mean (1.79, SD = 0.71), followed by chasse step (1.77, SD = 0.58); both were interpreted as Fair. Lunge (1.70, SD = 0.53) and split step (1.55, SD = 0.57) were interpreted as Poor, with split step having the lowest mean. Standard deviations ranged from 0.53 to 0.71, the widest spread being in stance and the narrowest in lunge. The overall pre-test weighted mean was 1.70 (SD = 0.59), interpreted as Poor.

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Post-test Performance After the STAD Strategy

Table 4 shows the corresponding post-test results. No respondent was in the Fair or Poor range for any skill.

Table 4. Post-test Performance of the Respondents in the Basic Badminton Footwork Skills (N = 50)

Footwork skill	Very Good (4) 3.26–4.00	Good (3) 2.51–3.25	Fair (2) 1.76–2.50	Poor (1) 1.00–1.75	Weighted mean	*SD*	Level
Stance	48 (96.0)	2 (4.0)	0 (0.0)	0 (0.0)	3.87	0.25	Very Good
Split step	46 (92.0)	4 (8.0)	0 (0.0)	0 (0.0)	3.73	0.33	Very Good
Lunge	40 (80.0)	10 (20.0)	0 (0.0)	0 (0.0)	3.57	0.37	Very Good
Chasse step	42 (84.0)	8 (16.0)	0 (0.0)	0 (0.0)	3.51	0.38	Very Good
Overall					**3.67**	**0.33**	**Very Good**

Note. Cells show frequency (percentage). Weighted mean levels are as in Table 3.

Stance. Forty-eight respondents (96.0%) achieved a Very Good rating and 2 (4.0%) a Good rating. The weighted mean was 3.87 (*SD* = 0.25), the highest of the four skills.

Split step. Forty-six respondents (92.0%) were rated Very Good and 4 (8.0%) Good, with a weighted mean of 3.73 (*SD* = 0.33).

Lunge. Forty respondents (80.0%) were rated Very Good and 10 (20.0%) Good, with a weighted mean of 3.57 (*SD* = 0.37).

Chasse step. Forty-two respondents (84.0%) were rated Very Good and 8 (16.0%) Good, with a weighted mean of 3.51 (*SD* = 0.38), the lowest of the four skills.

Summary. All four skills reached the Very Good level after the intervention. The proportion of respondents rated Very Good was highest in stance (96.0%), followed by split step (92.0%), chasse step (84.0%), and lunge (80.0%). The overall weighted mean was 3.67 (*SD* = 0.33). Skills with more respondents in the Very Good category also had higher weighted means and smaller standard deviations: stance had the lowest standard deviation (0.25) and the highest weighted mean (3.87), whereas chasse step had the lowest weighted mean (3.51) and the highest standard deviation (0.38). All standard deviations were small (0.25–0.38).

Significant Difference Between Pre-test and Post-test Performance

Table 5 and Figure 4 compare pre-test and post-test performance. Overall, the weighted mean rose from 1.70 (Poor) to 3.67 (Very Good). The paired-samples *t*-test showed statistically significant differences between pre-test and post-test performance in all four skills (all $p < .001$, below the .05 significance level), so the null hypothesis was rejected for every skill.

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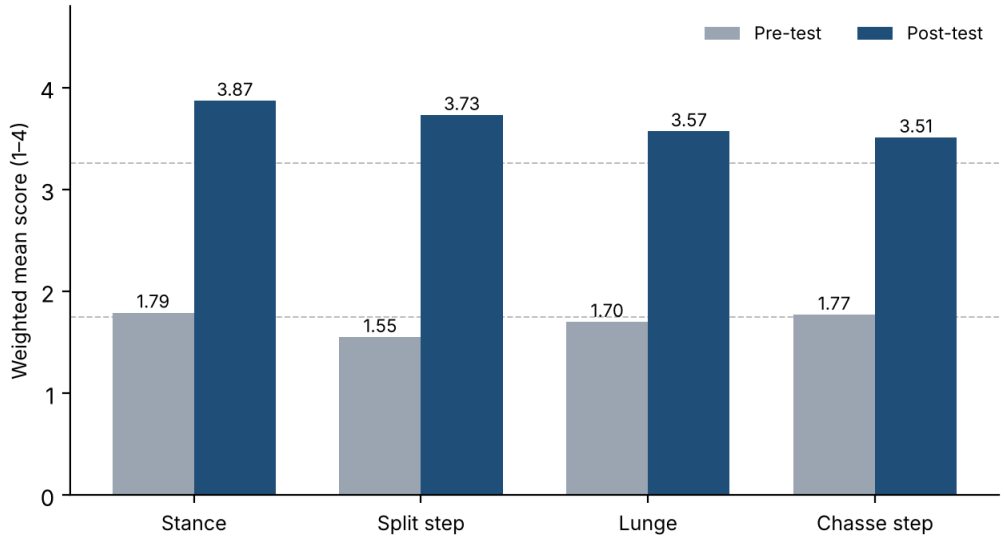
Table 5. **Test of the Significant Difference Between the Pre-test and Post-test Performance (N = 50)**

Skill	Pre-test *M*	Post-test *M*	Mean difference	*t*	*df*	*p*	Cohen's *d*	Decision
Stance	1.79	3.87	2.08	19.7	49	< .001	2.79	Reject H_0
Split step	1.55	3.73	2.18	23.5	49	< .001	3.32	Reject H_0
Lunge	1.70	3.57	1.87	22.6	49	< .001	3.20	Reject H_0
Chasse step	1.77	3.51	1.73	17.7	49	< .001	2.51	Reject H_0

Note. $p < .05$ indicates a significant difference; for every skill, there is a significant difference between pre-test and post-test performance. Effect sizes (Cohen's *d*): 0.20–0.49 small, 0.50–0.79 medium, 0.80–1.29 large, ≥ 1.30 very large.

Split step recorded the highest mean difference (2.18), *t* value (23.5), and effect size ($d = 3.32$), indicating that although it was the weakest skill at baseline, it showed the greatest improvement. Stance (mean difference = 2.08, $d = 2.79$) and lunge (1.87, $d = 3.20$) followed, and chasse step showed the smallest gain (1.73, $d = 2.51$). The effect sizes of all four skills fell in the very large category.

Figure 4. **Weighted Mean Scores in the Pre-test and Post-test by Footwork Skill**



Note. Dashed lines mark the category thresholds: Poor (up to 1.75) and Very Good (3.26 and above).

Enhanced Instructional Module on Basic Footwork Skills in Badminton

Based on the findings, an Enhanced Instructional Module on basic footwork skills in badminton was developed (Table 6). Basic footwork skills are highly important to students' efficient movement, balance, and coordination in physical activities. The module supports the objectives of Article XIV, Section 19 of the 1987 Philippine Constitution, which encourages sports and physical education to promote self-discipline, teamwork, and a healthy citizenry, and of CMO No. 39, series of 2021, which highlights high-quality physical education programs in higher

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education institutions. Through it, students are encouraged to participate actively in badminton activities that enhance their physical fitness, sportsmanship, and overall well-being. The skill-by-skill guide (important tips and common mistakes) is provided in Appendix A.

Table 6. Enhanced Instructional Module on Basic Footwork Skills in Badminton

Course outcomes	At the end of the course, students will be able to: CO1. Demonstrate proper execution of the fundamental badminton footwork skills—stance, split step, lunge, and chasse step—with accuracy, balance, coordination, and agility during practice and game situations. CO2. Apply the basic footwork skills in badminton effectively through cooperative learning activities and game-based performance, while showing teamwork, discipline, sportsmanship, and active participation.
Intended learning outcomes	ILO1. Execute the badminton footwork skills correctly and confidently during practice drills and learning activities. ILO2. Collaborate effectively in group activities by applying basic badminton footwork skills while demonstrating teamwork, cooperation, and good sportsmanship.
Learning materials and references	PowerPoint presentation Printed course syllabus Video clips for demonstration
Topics	Badminton: Types of Basic Footwork Skills — stance, split step, lunge, chasse step
Time allotment	2 hours per week
Procedures	Week 1: Pre-test facilitation and feedback. In facilitating the pre-test performance, students are divided into groups of four to five members and assigned to specific lanes to perform the skills. Week 2: Introduction and lecture. Demonstration of the types of footwork skills. Week 3: Practice time and feedback. Peer/groupmate and teacher feedback. Week 4: Post-test facilitation and answering of the survey questionnaire. The same procedure used during the pre-test facilitation is followed: students are divided into groups and assigned by the researcher.
Assessment activity	Performance task: Types of footwork skills (pre-test and post-test): (1) stance, (2) split step, (3) lunge, (4) chasse step

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DISCUSSION

This study examined whether STAD-based instruction was associated with improved performance in four fundamental badminton footwork skills among teacher education students. The discussion interprets the baseline and post-intervention results, the size of the pre–post differences, their relation to the theoretical framework, and the limits of the evidence.

Baseline Footwork Performance

Before the intervention, students did not have good proficiency in any of the four skills: most scored in the Poor range, and the overall weighted mean of 1.70 was interpreted as Poor. The high proportion of students in the Poor category for the stance, together with its relatively low weighted mean, indicates that most students did not know the proper badminton stance at the pre-test. This may mean that they had little previous experience of the stance mechanics, body alignment, balance control, and ready movement that good badminton footwork requires. Students should therefore practice maintaining a shoulder-width stance, bending the knees correctly, shifting weight to the balls of the feet, and keeping the upper body slightly forward to develop balance and quick changes of direction. Instructors should provide more structured footwork drills, repeated demonstrations, corrective feedback, and progressive skill practice to improve stance execution (Toshniwal et al., 2024). The standard deviation of 0.71, the largest of the four skills, shows that stance scores were more spread out than the others, with some students performing at higher levels.

For the split step, the timing, balance, body coordination, and explosive movement involved were challenging for most students. This points to the need for instructional strategies and interventions that focus on this competence, including guidance, drills, feedback, and organized practice sessions. Because the split step is a basic footwork skill, a lack of proficiency could reduce students' readiness, court-movement efficiency, and response time on the badminton court. Promoting peer support, active engagement, and ongoing practice through cooperative and interactive teaching strategies may enhance skill acquisition (Wang et al., 2023).

The same pattern appeared for the lunge. With 72.0% of students in the Poor category, most did not fully master the technique, which suggests that they lacked proper footwork, balance, body position, and movement coordination—abilities that are essential for playing the game successfully. Students who lunge incorrectly also have more difficulty recovering, remaining stable, and reaching the shuttle during games. There is therefore a clear need to improve lunge performance through structured and repetitive practice, demonstration of proper mechanics, corrective feedback, and drills that target balance, agility, and lower-body strength. Modified teaching strategies that promote peer support, active engagement, and continuous feedback during skill practice may also help (Malwanage et al., 2022). The comparatively low standard deviation (0.53) shows that lunge scores were fairly similar, with most students scoring low.

Limited mastery of the chasse step may be attributed to the participants' lack of exposure, lack of experience, and insufficient practice of correct execution. This can affect court coverage, movement, balance, and readiness while playing, and it suggests that many students still struggle with body control, speed, coordination, and correct foot placement during lateral movement. Without a good chasse step, students may also be unable to respond quickly to the shuttle or to play sharp strokes. To improve the skill, students should focus on good body position, keep their balance with bent knees, increase the speed of lateral movement, and practice consistent foot placement. Repetitive drills, shadow footwork exercises, agility training, and guided demonstrations may enhance overall footwork performance and execution (Williyanto et al., 2023).

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Across the four skills, stance and chasse step obtained relatively higher pre-test means than split step and lunge. Stance is one of the simplest skills to perform because it mainly involves maintaining appropriate posture, readiness, and balance, and students were already accustomed to moving laterally in everyday physical activities, which may explain the relatively higher chasse-step rating. The split step and lunge received lower ratings because they demand greater timing, agility, coordination, and lower-leg strength. This agrees with Faozi et al. (2023), who found that students often have difficulty with movement skills that require quick reaction and coordination, especially when first learning them, and therefore perform less well in complex motor skills. Standard deviations were similar across skills (0.53 to 0.71), which indicates that most students performed at similar levels, and smaller standard deviations denote more consistent performance among respondents (Baena-Morales et al., 2023). The weak baseline may also reflect limited opportunities for practice, movement mechanics, confidence in technical skills, and exposure to badminton-specific footwork drills.

Footwork Performance After the STAD-Based Intervention

After the intervention, all four skills reached the Very Good level, with no student in the Fair or Poor categories. For the stance, 96.0% of students achieved a Very Good rating (weighted mean = 3.87, *SD* = 0.25). This pattern is consistent with the progress that STAD may foster in students' postural understanding through cooperation and peer support, active engagement, and continuous practice: by learning from each other, giving feedback, and correcting errors, students could improve their body posture, balance, and readiness. The very high consistency among respondents suggests that nearly all students improved. Because almost all responses were rated Very Good, cooperative learning techniques such as STAD appear to be usable for developing psychomotor skills in PE, since students may learn more efficiently and reliably from peer collaboration, teamwork, and continuous feedback. To promote active learning, improve skill learning, and create a more supportive learning atmosphere, PE teachers may consider integrating STAD into basic badminton skill training (Iglesias et al., 2023).

Split-step performance likewise improved considerably (92.0% Very Good; weighted mean = 3.73, *SD* = 0.33), which suggests that almost all students could perform the skill with good timing, balance, and movement efficiency. The small variation between respondents' scores supports this. These results are consistent with STAD's emphasis on working collaboratively in groups, participating actively, supporting one another, and receiving feedback from peers, all of which matter for learning movement-based skills such as the split step. Organized group learning in PE may also enhance students' psychomotor skills, confidence, and involvement when performing skills, and PE teachers may consider STAD for improving badminton footwork competencies and other skills, especially in sessions that involve a lot of movement (Yang et al., 2021).

In the lunge, 80.0% of students were rated Very Good and 20.0% Good (weighted mean = 3.57, *SD* = 0.37). Students appeared to carry out the skill with appropriate body positioning, balance, coordination, and accuracy, and the fact that no one was classified as Fair or Poor means that all performance levels were satisfactory to excellent. The standard deviation of 0.37 shows that scores were clustered, indicating consistent performance (Ishak et al., 2025).

Chasse-step performance was also high (84.0% Very Good, 16.0% Good; weighted mean = 3.51, *SD* = 0.38). Most respondents performed the skill correctly with few to no errors. The large proportion at the Very Good level suggests that collaborative learning helped students comprehend and perform the proper movement pattern, and the low standard deviation suggests that learning gaps between students narrowed, so that students of different abilities reached similar levels. Physical education teachers may therefore consider introducing STAD in teaching movement skills to enhance psychomotor performance, motivation, and skill retention (Dyson, 2022); note, however, that motivation and retention were not measured in this study.

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Skills with more students in the Very Good category showed smaller standard deviations and higher weighted means: stance had the highest frequency of Very Good ratings, the lowest standard deviation (0.25), and the highest weighted mean (3.87), indicating excellent and remarkably consistent performance, whereas chasse step had the lowest weighted mean (3.51) and the highest standard deviation (0.38), indicating comparatively greater variation. The low standard deviations across all skills indicate that students' performances were gathered in a narrow range, which is consistent with STAD both improving performance and encouraging students to keep developing their skills (Yeni et al., 2023).

Magnitude of Improvement

The paired-samples *t*-test confirmed statistically significant differences between pre-test and post-test performance across all skills (all $p < .001$), and the null hypothesis was rejected for all of them. The overall mean improved from 1.70 (Poor) to 3.67 (Very Good). The smaller standard deviations at post-test also indicate more consistent responses. This is consistent with Setiawan et al. (2023), who reported that cooperative learning methodologies have a positive effect on students' psychomotor performance by providing repeated practice, peer support, and feedback that lead to greater skill mastery and more consistent execution.

Split step recorded the largest mean difference (2.18), *t* value (23.5), and effect size (3.32). Although it was initially the most difficult skill, it showed the greatest improvement, which suggests that STAD, with its collaboration, cooperation, and supervised practice, can be a very effective approach for developing more advanced movement skills. The effect sizes for stance, lunge, and chasse step were also extremely large, indicating a high practical effect. These findings are comparable with those of Syahruddin et al. (2023), who found STAD very effective in improving students' motor skill development and technical performance, particularly in sports skills that are difficult to perform because they are timed, coordinated, and repetitive. The relative ordering of skills did not remain the same after the intervention: chasse step, second-highest at pre-test, had the lowest post-test mean and the smallest gain, whereas split step moved from lowest to second-highest. At baseline, however, simpler and more familiar movement patterns were performed better than more complex ones.

Skills that scored lower at baseline, especially the split step and lunge, call for specific training to improve speed, coordination, and movement efficiency, such as agility ladders, response training, cone training, shadow badminton, and plyometrics. Because most students had reached the Very Good level in stance and chasse step, the very high post-test means (3.51–3.87) leave little room for further measurable gain, and more demanding performance criteria may be needed to distinguish levels of mastery.

Implications for Theory and Practice

The findings are consistent with Cooperative Learning Theory: students appear to learn better when they work with one another toward shared goals, and shared responsibility, cooperation, and peer support through organized group activities are important for improving students' capability and learning outcomes. The improvement in footwork could plausibly be attributed to peer demonstration, group practice, and peer feedback during the activities (Social Learning Theory), as well as to repeated practice, hands-on sessions, and constructive feedback during the STAD sessions (Experiential Learning Theory), which helped students practice and refine their fundamental footwork skills. These mechanisms are inferred from theory and from the instructional design; they were not measured directly in this study. In general, the application of STAD to enhance badminton footwork skills is closely related to cooperative, social, and experiential learning theories.

For practice, the results support the use of STAD for teaching basic badminton skills in tertiary PE, with clear instructions, helpful demonstrations, and ongoing support from teachers. The Enhanced Instructional Module (Table

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6; Appendix A) translates the four-week sequence of pre-test and feedback, lecture and demonstration, practice with peer and teacher feedback, and post-test into a reusable teaching resource aligned with CMO No. 39, series of 2021, and Article XIV, Section 19 of the 1987 Philippine Constitution.

Limitations

Several limitations should be considered when interpreting the findings. First, the single-group pretest–posttest design has no comparison group, so improvement cannot be attributed to STAD alone: the effects of instruction in general, repeated practice, familiarity with the test tasks, and the passage of time cannot be separated from the effect of the cooperative structure. Second, the intervention lasted four weeks with one session per week, and retention of the skills was not assessed. Third, the sample comprised 50 students from two blocks of one institution, selected by convenience, which limits generalizability. Fourth, the performance ratings came from a teacher-made rubric; the researcher took part in rating the post-test, and raters were not reported to be blind to the testing occasion; evidence of the rubric's validity and inter-rater reliability should be reported. Fifth, post-test scores approached the ceiling of the four-point scale, and the ordinal rubric scores were analyzed with a parametric test; a non-parametric check would be a useful sensitivity analysis. Finally, engagement, motivation, and social interaction—the outcomes through which cooperative learning is expected to work—were not measured, and the fidelity of implementation of the individual STAD components was not documented.

CONCLUSIONS AND RECOMMENDATIONS

Summary of Findings

The study determined the effectiveness of STAD in improving the basic badminton footwork skills (stance, split step, lunge, and chasse step) of the respondents, using quantitative analysis. Before the STAD strategy, respondents did not have good proficiency in the four basic footwork skills, and most scored poorly: split step and lunge were rated Poor, while stance and chasse step were only Fair. After the STAD strategy, performance improved clearly, and the post-test mean score rose to Very Good performance, with each of the four skills very high. The paired-samples *t*-test showed a statistically significant difference between pre-test and post-test scores in all four competencies, and the null hypothesis was therefore rejected.

Conclusions

Students' performance improved significantly after STAD-based instruction, a result that supports cooperative learning theory: students appear to learn better when they work with each other to meet common goals, with higher results in performance and involvement. The advantages of shared responsibility, cooperation, and peer support suggest that organized group activities are important for improving students' capability and learning outcomes.

The improvement in badminton footwork skills may be attributed to peer demonstrations, group practice, and peer feedback during the activities, and to the repeated practice, practical sessions, and constructive feedback that characterized the STAD sessions; together, these helped students learn more effectively as they practiced and refined their fundamental footwork skills. Because the study lacked a control group and did not directly measure these processes, the attribution is tentative.

In general, the findings suggest that applying STAD to enhance badminton footwork skills is closely related to cooperative learning, social learning, and experiential learning theory.

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Recommendations

Teachers are encouraged to use the STAD teaching method, especially in teaching PE content such as badminton. Cooperative learning methods can help students enhance their skills and make learning more interesting; teachers should provide clear instructions, helpful demonstrations, and ongoing support to guide students through the learning process, and should add training sessions and targeted feedback to help students master the more complex skills.

School administrators are encouraged to adopt creative, student-centered teaching by organizing seminars, trainings, and workshops that promote cooperative learning in the curriculum. These opportunities enable educators to become more knowledgeable and confident in using techniques such as STAD in their face-to-face classes.

Students are encouraged to be active in developing their badminton skills through group activity, cooperation with fellow students, and attendance at regular training sessions. In a cooperative and encouraging learning environment, students can feel appreciated, have less fear and anxiety, and gain confidence in their ability to complete tasks.

Future researchers are urged to carry out comparable studies with larger groups of participants, in other contexts, and with more advanced skills, preferably using control or comparison groups, in order to validate the results of this study. Future studies can also explore the long-term impact of the STAD strategy on performance and skill retention, its effects on engagement, motivation, and social interaction, and its effectiveness across the curriculum and in other sports.

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