Development of Team Cohesion and Sustained Collaboration Skills with the Sport Education Model

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Abstract: Physical education is crucial to the development of physical and social abilities. Team cohesion, nurtured in physical education, influences team performance and provides skills that students may translate into future social arenas. However, whether teaching strategy in physical education affects the development of team cohesion remains uncertain. The sport education model (SEM) enhances sport skills, rule knowledge, sport etiquette, and affective development through games and competition. The SEM has replaced many conventional physical education curricula in advanced countries. Therefore, this quasi-experimental pretest–post-test study investigated the effects of the SEM on team cohesion. Undergraduate volunteers from a Taiwanese university were divided into experimental and control groups for a 10-week basketball course taught using the SEM or direct instruction, respectively. Pretest and post-test questionnaires utilized a team cohesion scale, with subscales measuring teamwork, team adaptation, and interpersonal interaction. Experimental group (M_pre = 3.35 ± 0.42, M_post = 3.98 ± 0.50) scores for overall team cohesion and the three subscales were significantly improved after the course; no significant improvement was noticed in the control group (M_pre = 3.23 ± 0.58, M_post = 3.57 ± 0.57). Furthermore, all post-test scores for the experimental group (M = 3.98 ± 0.50) were higher than those for the control group (M = 3.57 ± 0.57). Therefore, the SEM is a feasible model for improving team cohesion and thus related social skills students may sustain into adulthood.

Keywords: physical education; teaching strategy; team sports; education for sustainability

1. Introduction

The Japanese scholar Masakazu Yano once said: “Effective learning experiences in the university could benefit the current income of a person, if such experiences continued in the workplace.” Nurturing students to develop basic abilities, which they may sustain to become a socially competent adult, through physical education is crucial. Physical education is one of the few subjects in education that develops the cognitive, affective, and psychomotor domains of students [1], offers a chance to communicate face-to-face with peers, and allows students to take on different social roles. In physical education, students learn social skills, such as interpersonal interactions, tolerance, and respect, in addition to team cohesion skills, such as teamwork and team adaptation. Additionally, students learn to strengthen their confidence and self-esteem, and the development of social cognition is reinforced [2]. With respect to the social responsibility of physical education, Brinkley et al. [3] underscored that team sport holds benefits not only for individual health but also for group cohesion and performance and organizational benefits, such as the increased work performance. Cronin et al. [4] revealed that physical education can help students develop skills, such as teamwork, goal-setting, time management, emotional skills, interpersonal interaction, social skills, leadership, problem-solving, and decision-making. Additionally, physical education enables students to experience the fun of exercising and develop a positive attitude toward physical activities and training through a variety of experiences.
of physical activities [5]. Physical education that adopts team activities and interactions influences students’ future attitudes. Moreover, the course design and application of physical education are key elements enhancing team cohesion.

The Physical Education curriculum is an overall plan for the total Physical Education program, which is intended to guide teachers in conducting educational activities for a specific group of students [6]. One of the primary goals of physical education is for students to gain the motivation to continue to be physically active outside of curriculum time [7]. For teenagers, physical education is beneficial experiential learning and an indispensable part of the curriculum; it serves as a substantial medium for developing regular exercise habits. However, teaching strategy should consider that not all students like physical education courses. When children enter adolescence, their learning motivation usually decreases [8]. Gallé [9] considered that the importance of physical education was often underestimated despite it being beneficial for physical conditioning and health. In other words, the old-time learning methodology no longer meets the contemporary needs. Educational institutes should provide students with correct and complete sports experiences courses to foster the experience value of physical education courses. Athletic and educational pursuits are not only compatible but also complementary [10]. Lupo et al. [11] indicated that, to develop a better understanding of the athletes’ sport and academic motivation, the same construct has to be investigated in relation to different sport and educational systems. However, conventional lecturing and independent learning methods have been replaced by diversified teaching methods. From the perspective of teaching outcomes, teamwork and adequate course design are crucial to the success of physical education courses [5]. The point is for learners to prioritize tight collaboration of the team over their individual interests. The strongest and most direct effects of the teacher on the student result from the teaching strategy and plans and ideas of teaching that the teacher holds [8]. Said aspects are closely tied to the teaching and learning context. Teaching outcomes are the focal point for all physical education teachers. However, the results of teaching are generally dependent upon the interaction between the students and teaching strategy. Thus, the chosen teaching model plays a critical role in addition to the personal characteristics of the student. Therefore, in addition to helping students gain knowledge and value through different teaching strategies, course design must be able to prepare students for future social life through the development of sustainable competencies.

1.1. Development of the Sport Education Model

The sport education model (SEM) was originally proposed in elementary and middle schools in the state of Ohio of the United States in the 1980s and has been developed in New Zealand and Australia [12]. The SEM has gradually replaced conventional physical education courses with diversified activities [13]. The SEM is a curricular teaching model based on game theory and public sport participation [14]. This model enhances sport skills, rule knowledge, and affective development through games and enables students to learn to follow sport etiquette by participating in sporting competitions. The SEM—a curricular model in theory and novel teaching method in practice—has become the mainstream method of physical education in various advanced countries, including the United States, New Zealand, and Australia [15]. Siedentop [16] identified six characteristics of the SEM: seasons, affiliation, formal competition, culminating events, record keeping, and festivities. The focal point of such courses is to learn about sport and game participation. Teachers must design an active and positive teaching environment to offer sports and competitive activities for all students. The aim of this model is to nurture students’ voluntary participation and interest in sports to develop their sports skills and understanding of strategy. Additionally, teamwork is introduced into the sport scenario to develop students’ sport ethics.

The SEM is a powerful teaching model [17] that enables teachers to provide a real, attractive, and joyful learning environment for students [18], where students can enjoy companionship and a sense of belonging when participating. Additionally, peers are highly tolerant toward one another [19]. The relationships in these teams are extremely attractive for students; students were found to maintain
an exceptionally high interest even after the end of courses [20]. With respect to the course, the SEM proceeds like a game, which benefits the sport participation rate and learning motivation of students and establishes a joyful learning environment. As students play a variety of roles in competition, educational sport experiences become deeper, wider, richer, and more positive and complete [21–24]. The communication process among peers is considered the proactive core of the SEM [25,26]. The success of the SEM results from providing more opportunities for students to participate in the team education experience in physical education [27]. This teaching and learning method can enhance the development of learners in physical education. Although the aforementioned literature has presented positive SEM research results, none of the teaching strategies or models fit all situations. Stran and Curtner-Smith [28] advised preservice teachers to teach in a teacher- or coach-oriented manner and focus on the promise before the season starts; the most commonly encountered problems for these teachers is teaching students to role-play. When arranging team competition, teachers often employ the SEM to enhance the morale and motivation of students. Physical education teachers must pay extra attention to and encourage students with relatively poor performance [29].

As previously mentioned, most scholars have focused on such topics as the participation motivation, course development, physical activity level, and learning environment rather than on the development of team cohesion in SEM courses. To analyze the development of team cohesion through SEM course design, the present study used team cohesion as a variable to determine whether students could obtain actual sport experiences through the implementation of the SEM. Additionally, students were given control during the course through playing different roles. These activities enabled students to have interpersonal interactions during the learning process, which stimulated their growth in learning, increased their sense of responsibility, and engendered complete team cohesion.

1.2. Team Cohesion in Physical Education

Humans are social animals that require recognition and learn from one another. Additionally, individuals are closely related to their teams [30]. In other words, cohesion is an important small group variable within sport [31] and a common concept [32]. Once team cohesion is established, members of a team can enhance team-related models and collective confidence [33]. Team-building activities can elevate the confidence of the participant, enhancing mutual support among team members, and increasing physical coordination and the joy of peer interaction [34]. Cohesion and success are highly correlated. Team cohesion is beneficial for increasing collective professionalism and team performance [32].

In the field of social psychology in sport, team cohesion is considered a series of dynamic process of mutual attraction and collaboration among members of a sports team toward team goals or organization. In 1950, Festinger [35] defined team cohesion as a driving force for a team that discourages members from leaving the team by proactively encouraging them to stay on the team. Carron [36] proposed that team cohesion referred to the dynamic process of team members working closely together to achieve a team goal. Team cohesion can be divided into team and individual aspects. The team aspect refers to individual team members’ evaluations of the team based on team tasks and interpersonal interactions; the personal aspect refers to the level of acceptance among the team members of an individual member joining and their feelings regarding the interpersonal relationship of the other members. Each aspect can be further divided into interpersonal relationship and task aspects. Interpersonal relationship refers to developing and maintaining social relationships with the team, such as friendships, emotional support, and acceptance between team members that grow into mutual appreciation. Tasks, which are marked by an objective and score indicators, refer to the cohesion that bounds team members through common objectives and tasks [37].

From the perspective of teamwork, teamwork is frequently employed in both physical education and the workplace. In team role theory, Belbin [38] indicated that the critical feature of a successful team is reasonable role assignment. Yukl [39] proposed that a team is a working group that consists of a group of people with a common goal, interdependent roles, and complementary skills. Teamwork is the
responsibility that interdependent individuals in small groups undertake to receive the benefits of an organization [40]. Therefore, the aforementioned scholars defined teamwork as having a common goal, being interdependent, and being achieved through communication and coordination. With respect to the team adaptation, team learning behaviors are a fundamental aspect of team adaptation [41]. Team adaptation has positive influences on team performance [42] and refers to the interaction of an individual and the environment [43,44]. A sports team is similar to a small society where the behavioral model of team members is subject to influences within the group. The SEM course revealed that role-playing enabled students to learn more meaningfully and try harder than they would under a traditional model [45]. In addition, with respect to the interpersonal interaction, the objective of teenage development is to obtain a sense of self-uniqueness. The most remarkable transformation is the formation of intimate friendships with peers and understanding of individual and common responsibilities, which are vital for the development of social skills [46]. In fact, sports are embedded within the educational environment (i.e., sports staff, training programmes, sports facilities), and athletes study and compete within the same institutions due to specific socio-cultural contexts and different relationships between the academic and sport environments [47]. Student interaction is a familiar feature of physical education lessons [48]. Unlike in other school subjects where teachers might select pedagogic strategies that involve student interaction to teach skills such as reading, group work is often an implicit part of doing physical education (PE) [49]. Hastie and Buchanan [50] indicated that implementing games in a course enables students to learn negotiation by planning game strategies and decision-making by acting as the referee. All the interpersonal interactions students experience during the learning course to achieve the goal are the authentic sports experiences.

The literature defines team cohesion as a dynamic process, in which individuals pursue a common goal, and members’ emotional needs are fulfilled [34,36,37]. An increase in team cohesion results in a remarkable increase of team performance. In other words, team cohesion and team performance constitute a circular relationship of social skills. Social attitudes and individual and collective behaviors learned by students during sporting activities are then available in the student’s behavioral repertoire and re-enacted and manifested in future contexts, such as work or family relations [51]. Therefore, team cohesion is considered a crucial influence determining the performance of a physical education team. In physical education, to solve the interpersonal coordination and communication problems in teams formed by students, members must trust one another and collaborate to make decisions collectively and help all members to fulfill their own responsibilities. From the perspective of the SEM, team-building activities in classes help students to learn to give and receive compliments. Such activities can retain a high participation rate among team members and enhance the development of a sense of belonging. Additionally, the SEM encourages students to learn multidimensionality, enables students to experience actual sports environments during education, and engenders in students the concepts of obedience, respect, responsibility, and teamwork. Regardless of whether a student plays the role of coach, player, referee, or observer, the SEM enables the enjoyment of a sense of accomplishment in the class and feelings resulting from team development.

The performance of a physical education team is closely related to team cohesion. However, the main interest for researchers was whether teaching strategy influences changes in team cohesion. The practical focus of a teacher is the performance of the student team, and an exceptional performance relies on high team cohesion. Therefore, team cohesion has become one of the most valued variables for educators; this indicates its research potential.

1.3. Hypotheses

According to social and economic exchange theory, team effectiveness could result from interaction, coordination, and collaboration between the team members [52]. An effective team is expected to perform to an extent that is greater than the sum of the individuals’ performance [53]. Saavedra et al. [54] indicated that team performance relies on mutual support among team members when executing a highly interdependent task. Particularly with sports that are highly dependent upon teamwork, such
as soccer or basketball, team cohesion must achieve solidarity. Interactive sports activities require high levels of task interdependence and teamwork cohesion to display a notable correlation with performance [55]. Therefore, the authors of present study consider that team cohesion is composed of teamwork, interpersonal interactions, and mutual trust and collaboration among team members. Sinelnikov and Hastie [20] corroborated this view and indicated that the SEM could reinforce team relationships. Additionally, formal competitions and perceptual learning are considerably attractive to students. The present study has two objectives: the first is to analyze the impact of a SEM unity on team cohesion (within effect), and the second is to compare team cohesion between a traditional teaching method and a SEM unit (between effects). Based on the aforementioned influencing factors and literature review, this study proposed that the SEM could enhance the nurturing of student team cohesion.

Therefore, we propose two research hypotheses, as follows.

**Hypothesis 1.** Students’ team cohesion (including teamwork, team adaptation, and interpersonal interaction) is significantly improved under the Sport Education Model.

**Hypothesis 2.** SEM Students’ team cohesion (including teamwork, team adaptation, and interpersonal interaction) is significantly better than the traditional teaching method.

2. Methodology

2.1. Research Design

This study had been reviewed by Thai Clinical Trials Registry Committee (TCTR), and was satisfactory for all items of Trial Registration Data Set required by the World Health Organization. The present study employed the nonequivalent pretest–post-test quasi-experimental design with an experimental group, which received the SEM method, and a control group, which received the direct instruction method. In consideration of ethical research, the research content, research activity design, feedback process for participants, possible harm or discomfort that may be experienced during the research, protection of privacy and information for participants, and freedom for participants to withdraw at any time were disclosed. The research continued with the consent of all recruited volunteers. A team cohesion scale pretest was conducted on the experimental and control groups before the start of the experimental course, and a post-test of the same scale was conducted after the 10-week experimental course.

2.2. Participants

Participants in this study were third-year students at a Taiwanese university. To mitigate the interference of irrelevant variables, students who had not received prior SEM teaching were the main target for recruitment. The total number of participants was 117, of which 59 were in the experimental group (18 men and 41 women, with an average age of 20.19 ± 0.57 years) and were recruited from the optional basketball course offered by the author. This course comprised a total of 20 h of basketball classes across 10 weeks. The control group had a total of 58 participants (24 men and 34 women, with an average age of 20.53 ± 1.10 years) from another basketball course offered in the same year at the same university. To limit any interference from external variables, these students did not take any other courses that employed the SEM.

2.3. Ideas for Course Design

The SEM is a curriculum and teaching model proposed by Siedentop [14,56] that can provide real learning experiences for students. The objective of this model is to shape students to become capable, educated, and passionate sportspersons. The course for the experimental group in this study was designed in accordance with the six characteristics of the SEM proposed by Siedentop [56]: seasons,
affiliation, formal competition, culminating events, record keeping, and festivities. The following basic principles were followed: (1) Shared learning responsibility between teacher and students (shifted from teacher-centered teaching to students’ autonomous learning); (2) Heterogeneous grouping (team members are selected by teachers, team leaders, or a sports committee organized by students); (3) Additional Physical Education lessons (encourage students to practice after class or school); (4) Assign other roles to students aside from players to inspire the cultivation of a sense of responsibility; (5) Activity design (simplified rules, use of assistive devices or facilities); (6) Record announcement and archival (used as a proof of individual or group performance and students’ learning record); and (7) Festivity after the teaching is concluded (establish various awards and recognitions and have an award conferment ceremony). The course for the control group was designed according to the teaching procedure proposed by Rosenshine [57], which presents teaching objectives, explains teaching material, implements group practice, observes student reactions, offers individual practice, and provides teacher feedback. It was implemented based on the following basic principles: (1) Teacher-centered teaching (make a systematic teaching plan); (2) Emphasize distributed learning (multiple unit activities are designed to implement teaching in small steps); (3) Emphasize error correction, diagnosis, remedial methods, and the importance of prerequisite skills; (4) Emphasize the importance of sufficient practice and performing a review, and provide possible methods; and (5) Emphasize formative assessment, and give immediate feedback to students’ learning progress and learning outcomes. The SEM teaching material was based on the aforementioned six characteristics, and the course objective was as presented in Table 1.

Table 1. Designing learning materials for educational objectives.

<table>
<thead>
<tr>
<th>Feature</th>
<th>Teachers</th>
<th>Students</th>
<th>Educational Objectives</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(1) Arranging sports seasons and training</td>
<td>(1) Learning about sports experiences</td>
<td>1. Cognitive objectives:</td>
</tr>
<tr>
<td></td>
<td>(2) Adjusting time based on teaching items and content</td>
<td>(2) Gaining sports knowledge</td>
<td>(1) Game planning and management</td>
</tr>
<tr>
<td>Affiliation</td>
<td>(1) Heterogeneous grouping</td>
<td>(3) Adjusting strategy and application</td>
<td>(2) Sports appreciation</td>
</tr>
<tr>
<td></td>
<td>(2) Conducting all practices and games in teams</td>
<td>(1) Assigning roles: team captain, referees, and record keepers</td>
<td>(3) Record keeping</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(2) Planning jobs and participating in games</td>
<td>(4) Strategy implementation</td>
</tr>
<tr>
<td>Formal</td>
<td>(1) Disclosing the event schedule</td>
<td>(1) Learning about teamwork</td>
<td>2. Affective objectives:</td>
</tr>
<tr>
<td>Competition</td>
<td>(2) Disclosing rewards</td>
<td>(2) Conducting strategy drills and developing team chemistry</td>
<td>(1) Rational decision-making</td>
</tr>
<tr>
<td></td>
<td>(3) Arranging warm-up matches</td>
<td>(3) Appreciating the game</td>
<td>(2) Etiquette, history, and rules of games</td>
</tr>
<tr>
<td>Culminating</td>
<td>(1) Disclosing event schedules for the finals</td>
<td>(1) Conducting strategy drills and developing team chemistry</td>
<td>(3) Team collaboration</td>
</tr>
<tr>
<td>events</td>
<td>(2) Analyzing the competition in the finals</td>
<td>(2) Appreciating the game</td>
<td>(4) Interpersonal interaction and team adaptation</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Record</td>
<td>(1) Instruction on the record-keeping method</td>
<td>(1) Learning the record-keeping method</td>
<td>3. Psychomotor domain:</td>
</tr>
<tr>
<td>Keeping</td>
<td>(2) Teaching the basis for final evaluation</td>
<td>(2) Learning the evaluation method</td>
<td>(1) Sport techniques</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>(2) Physical fitness</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>(3) Flexible rules that adapt to the ability levels of students</td>
</tr>
<tr>
<td>Festivity</td>
<td>(1) Maintaining a joyful atmosphere in classes</td>
<td>(1) Experiencing the meaning of sports</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(2) Hosting the awards ceremony in class</td>
<td>(2) Appreciating the ceremony</td>
<td></td>
</tr>
</tbody>
</table>

Organized by the author according to Jewett et al. [6]; Siedentop [14].

2.4. Research Tool

The research tool used in this study was the team cohesion scale, which adopted the 5-point Likert-type scale and assigned 5, 4, 3, 2, and 1 points to strongly agree, agree, neither agree nor disagree, disagree, and strongly disagree, respectively. A higher score indicated higher team cohesion as perceived by the respondent. This team cohesion scale took reference from the scales developed by Pan and Hsiau [58] and Wu [59] and comprised a total of 11 items analyzing three dimensions. The initial
scale for the critical value was between 6.8 and 13.68 based on the results from content analysis. Principal axis factors were adapted later for confirmatory factor analysis, extracting three factors (Teamwork, Team Adaptation, Interpersonal Interaction) in total, with a KMO of 0.882 and Bartlett’s Sphericity Test showed significance ($p < 0.001$). Four items concerned teamwork, three items concerned team adaptation, and four items concerned interpersonal interaction. With respect to the validity of the questionnaire, the factor loadings of each scale were as follows: teamwork was 0.63–0.79, team adaptation was 0.54–0.82, and interpersonal interaction was 0.58–0.89. Regarding the reliability of the scale, the Cronbach’s $\alpha$ of the overall scale was 0.89, whereas the Cronbach’s $\alpha$ of each subscale (i.e., teamwork, team adaptation, and interpersonal interaction) was 0.86, 0.88, and 0.81, respectively. The scale developed in this study had exceptional reliability and validity.

2.5. Data Analysis

This study conducted a pretest before the beginning of the course and a post-test after the end of the course. The Statistical Product and Service Solutions software package was employed to calculate the statistics with respect to data processing, and six analytical methods were applied to the results: 1. Descriptive statistics were applied to analyze the distributions of the height, weight, and body mass index (BMI) of participants; 2. Chi-square testing was used to conduct a homogeneity test on the gender of participants; 3. Independent-samples $t$ testing was used to analyze the homogeneity of the height, weight, and BMI of participants; 4. Paired-samples $t$ testing was applied to test for differences between participants in the experimental and control groups before and after the course; 5. Analysis of covariance (ANCOVA) was applied to compare and analyze the experimental and control groups in terms of team cohesion post-test results after excluding the influence of pretest scores; and 6. Based on the standard proposed by Cohen [44], the Cohen’s $d$ effect size was divided into three levels: small (0.2 or lower), medium (0.5), and large (0.8 or higher); the $\eta^2$ (eta squared) was used for ANCOVA, and the thresholds were set to $\leq 0.02$ for small, 0.059 for medium, and $\geq 0.138$ for large. The significance levels for all statistical tests in this study were set to $\alpha < 0.05$.

2.6. Homogeneity Test between the Experimental and Control Group

The demographic analysis results indicated that there were no significant differences between the groups in terms of age, weight, height, and body mass index (BMI), $t = 1.02, p > 0.05$. In addition, in terms of the gender distributions for the two groups, $x^2 = 2.51, p > 0.05$, suggesting that the two groups were homogenous. Table 2 summarizes the demographic characteristics and physical fitness of the participants in the two groups.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Exercise Group ($n = 59; M (SD)$)</th>
<th>Control Group ($n = 58; M (SD)$)</th>
<th>Total ($n = 117; M (SD)$)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender (male: female)</td>
<td>18:41</td>
<td>24:34</td>
<td>42:75</td>
</tr>
<tr>
<td>Age (years)</td>
<td>20.19 (0.57)</td>
<td>20.53 (1.10)</td>
<td>20.36 (0.89)</td>
</tr>
<tr>
<td>Height (cm)</td>
<td>168.81 (6.93)</td>
<td>166.53 (8.25)</td>
<td>167.68 (7.67)</td>
</tr>
<tr>
<td>Weight (kg)</td>
<td>62.83 (13.82)</td>
<td>59.41 (11.87)</td>
<td>61.14 (12.95)</td>
</tr>
<tr>
<td>BMI (kg/m²)</td>
<td>21.94 (3.99)</td>
<td>21.35 (3.38)</td>
<td>21.65 (3.69)</td>
</tr>
</tbody>
</table>

To determine differences in team cohesion, homogeneity tests on the internal regression coefficients of the two groups were conducted (Table 3). The results revealed no significant differences in terms of homogeneity ($F = 8.69, p > 0.05$), which indicated that the pretests of both groups did not have significant interaction. Because the correlations of the covariate (pretest scores) and dependent variable (post-test scores) within the experimental and control groups were not significantly different, the homogeneity results indicated that the internal regression coefficients of the covariates were fit for ANCOVA.
Table 3. Homogeneity test on the experimental and control groups.

<table>
<thead>
<tr>
<th>Source of Variation</th>
<th>Source</th>
<th>Type III Sum of Squares</th>
<th>df</th>
<th>Mean Square</th>
<th>F</th>
<th>p</th>
<th>η²</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Group * Pretest</td>
<td>2.26</td>
<td>1</td>
<td>2.26</td>
<td>8.69</td>
<td>0.27</td>
<td>0.13</td>
</tr>
<tr>
<td></td>
<td>Error</td>
<td>29.39</td>
<td>113</td>
<td>0.26</td>
<td></td>
<td></td>
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</tr>
</tbody>
</table>

* p < 0.05.

3. Results

3.1. Team Cohesion Pretest and Post-Test Analysis of the Experimental and Control Groups

Table 4 presents the mean score, standard error, and paired-sample \( t \) test of the pretest and post-test with respect to the course outcome, that is, the team cohesion of the experimental and control groups. Post-test scores for teamwork, team adaptation, interpersonal interaction, and the overall team cohesion scale of the participants in the experimental group were all higher than the pretest scores (\( t = -9.89, -7.51, -8.72, -10.33, ES = 0.70, 0.74, 0.76, 0.83 \)) and showed statistical significance (\( p < 0.05 \)). The pretest and post-test results of the control group for team cohesion (teamwork, team adaptation, interpersonal interaction, and overall team cohesion scale) did not show significant differences (\( p > 0.05, t = -3.94, -1.46, -2.95, -3.09, ES = 0.18, 0.13, 0.13, 0.05 \)). Additionally, the effect size of the overall team cohesion scale of the experimental group was 0.83, and those of the other three dimensions, namely teamwork, team adaptation, and interpersonal interaction, were 0.70, 0.74, and 0.73, respectively. The effect size of the overall team cohesion scale of the control group was 0.05, and those of the other three dimensions, namely teamwork, team adaptation, and interpersonal interaction, were 0.18, 0.18, and 0.13, respectively. According to the effect size results, participants of the experimental group had a medium change in terms of team cohesion. Particularly, the overall team cohesion scale presented the highest level of change (Cohen’s \( d = 0.83 \)). According to Cohen [60], the change in team cohesion for participants in the experimental group was statistically significant.

Table 4. Pretest–post-test differences in experimental and control groups.

<table>
<thead>
<tr>
<th>Source of Variation</th>
<th>Group</th>
<th>Pretest M</th>
<th>Pretest SD</th>
<th>Post-Test M</th>
<th>Post-Test SD</th>
<th>Paired-Sample ( t ) Test</th>
<th>p</th>
<th>Cohen’s ( d )</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Experimental</td>
<td>3.33</td>
<td>0.41</td>
<td>4.04</td>
<td>0.56</td>
<td>( t = -9.89 ) *</td>
<td>0.01</td>
<td>0.70</td>
</tr>
<tr>
<td></td>
<td>Control</td>
<td>3.22</td>
<td>0.62</td>
<td>3.69</td>
<td>0.60</td>
<td>( t = -3.94 )</td>
<td>0.50</td>
<td>0.18</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3.28</td>
<td>0.54</td>
<td>3.87</td>
<td>0.56</td>
<td>( t = -7.51 ) *</td>
<td>0.01</td>
<td>0.74</td>
</tr>
<tr>
<td></td>
<td>Experimental</td>
<td>3.25</td>
<td>0.59</td>
<td>3.42</td>
<td>0.68</td>
<td>( t = -1.46 )</td>
<td>0.62</td>
<td>0.13</td>
</tr>
<tr>
<td></td>
<td>Control</td>
<td>3.41</td>
<td>0.47</td>
<td>4.01</td>
<td>0.52</td>
<td>( t = -8.72 ) *</td>
<td>0.01</td>
<td>0.76</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3.22</td>
<td>0.65</td>
<td>3.55</td>
<td>0.59</td>
<td>( t = -2.95 )</td>
<td>0.63</td>
<td>0.13</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3.35</td>
<td>0.42</td>
<td>3.98</td>
<td>0.50</td>
<td>( t = -10.33 ) *</td>
<td>0.01</td>
<td>0.83</td>
</tr>
<tr>
<td></td>
<td>Experimental</td>
<td>3.23</td>
<td>0.58</td>
<td>3.57</td>
<td>0.57</td>
<td>( t = -3.09 )</td>
<td>0.85</td>
<td>0.05</td>
</tr>
<tr>
<td></td>
<td>Control</td>
<td>3.23</td>
<td>0.58</td>
<td>3.57</td>
<td>0.57</td>
<td>( t = -3.09 )</td>
<td>0.85</td>
<td>0.05</td>
</tr>
</tbody>
</table>

* p < 0.05.

3.2. ANCOVA on Team Cohesion of the Experimental and Control Groups

According to Table 5 and Figure 1, after excluding the influence of the covariate (pretest scores) on the dependent variable (post-test scores), ANCOVA results indicated that the implementation of the SEM in the experimental group resulted in remarkable outcomes in terms of team cohesion. Specifically, post-test scores of the experimental group in teamwork (M = 4.04 > 3.69), team adaptation (M = 3.87 > 3.42), interpersonal interaction (M = 4.01 > 3.55), and the overall team cohesion scale (M = 3.98 > 3.57) were all notably superior to those of the control group. Moreover, the \( F \) values were 10.48, 14.82, 16.95, and 16.51, and statistical significance (\( p < 0.05 \)) was observed. According to the \( η^2 \) (eta squared) standard proposed by Cohen [60], the effect size results of team cohesion obtained in this
study had a medium to large effect; the $\eta^2$ values were 0.09–0.14. The experimental course developed in this study significantly improved the team cohesion of participants. These results suggest that the SEM group students improved their team cohesion more than their peers in the control condition.

<table>
<thead>
<tr>
<th>Source of Variation</th>
<th>Type III Sum of Squares</th>
<th>df</th>
<th>Mean Square</th>
<th>$F$</th>
<th>$p$</th>
<th>$\eta^2$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Teamwork</td>
<td>3.50</td>
<td>1</td>
<td>3.50</td>
<td>10.48</td>
<td>0.01</td>
<td>0.09</td>
</tr>
<tr>
<td></td>
<td>36.05</td>
<td>108</td>
<td>0.33</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Team Adaptation</td>
<td>5.62</td>
<td>1</td>
<td>5.62</td>
<td>14.82</td>
<td>0.01</td>
<td>0.12</td>
</tr>
<tr>
<td></td>
<td>40.95</td>
<td>108</td>
<td>0.38</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Interpersonal Interaction</td>
<td>5.14</td>
<td>1</td>
<td>5.14</td>
<td>16.95</td>
<td>0.01</td>
<td>0.14</td>
</tr>
<tr>
<td></td>
<td>32.76</td>
<td>108</td>
<td>0.30</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total Team Cohesion</td>
<td>4.63</td>
<td>1</td>
<td>4.63</td>
<td>16.51</td>
<td>0.01</td>
<td>0.14</td>
</tr>
<tr>
<td></td>
<td>30.27</td>
<td>108</td>
<td>0.28</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* $p < 0.05$.

Figure 1. Team Cohesion performance between the experiment group and the control group.

4. Discussion

The research outcome indicated that SEM intervention effectively improved the team cohesion (including teamwork, team adaptation, and interpersonal interaction) of students compared with a traditional teaching method, and the hypotheses of the study were confirmed. The situated learning enriched the actual sports experience. In the team learning mode, the right to make learning decisions has shifted from teacher to students, and the sense of responsibility in individuals was thus cultivated. As for social behavior development, with the foundation of fair competition, students are encouraged to learn team skills for different roles and achieve a better learning outcome. These results supported the hypotheses: applying the SEM to physical education is effective in improving team cohesion; and students participate more proactively in SEM classes than under the conventional teaching method. These findings were similar to those of previous studies [17,61,62]. The SEM improved team cohesion and rendered outcomes superior to expectations [20]. The authors of present study propose that the teamwork model of the SEM already embodies the team learning spirit. Moreover, the competition-centered design provides students flexibility and offers diversified evaluation methods.

The SEM is confirmed to be an effective teaching mode with a positive influence [63]. SEM encourages students to create profound meaning within individuals, integrate different information, construct an overall feeling towards the learning content on one’s own initiatives, and develop personal potentials and skills, which should be very different from traditional teaching methods [64]. Physical education mode courses adopt game theory as the foundation and emphasize
the learning history of the team. SEM physical education encourages students to learn through a social interactive mode to cooperate and integrate messages from multiple directions, whereas traditional teaching methods focus on the linear mode for the teacher to lead the teaching and learning of students in a single direction [64]. In other words, teachers who apply SEM provide abundant learning opportunities [65], assist students to acquire social interaction skills in classes, and allow students to have team cohesion and the ability to depend on each other.

In addition, the SEM employs seasons in its design to gradually empower power students to participate in activities and educate students regarding their individual and common responsibilities. This model increases the opportunity for peers to learn from one another in groups and enhances their abilities of leadership, participation, and teamwork through role-playing. This teaching strategy can effectively offer students opportunities to learn equality and team interaction. Thus, students can share their knowledge and nurture their ability for collaboration and spirit of mutual trust through learning as a collaborative team. Additionally, the development of the sustainable competitiveness of students for their future was a focus of the study.

4.1. Teamwork

In the SEM team scenario, peers work together in coordination for the common goal and demonstrate great team spirit on the sport field to obtain exceptional honors. The trust an individual has for other team members represents a belief that the team can achieve the goal. Similarly, Perlman [17] revealed that the SEM was able to support the psychological needs and self-determination of students through teamwork and its affective domain. The process of the SEM could enhance their sports relatedness, competence, and autonomy. Previous studies have revealed that teamwork was positively related to the success of a team [55] and could improve collective efficacy [66]. For the population of university students, this teaching model and structure enabled team members to respect the differences of their peers and communicate from a perspective of trust, thus establishing collaboration as a norm of the team. In this manner, students might be encouraged to participate in sports activities to enhance team operation.

4.2. Team Adaptation

Team learning plays a crucial role as an necessary, though not sufficient, condition for team adaptation [67]. Team adaptation, as a process, occurs when a team recognizes that a change happens in the team environment, and is able to effectively address the unexpected situation [68]. When team members engage in team learning processes, they evaluate and reflect on past performance episodes and interpret the consequences of team actions [42]. The establishment of a team in the course, assignment of team tasks, and achieving of team goals raised team awareness and a sense of cohesion for students in addition to a sense of belonging. The level of team adaptation in terms of mutual respect and care among team members affected the level of team cohesion. This is not a possible situation using the temporary groupings of conventional physical education classes. From the perspective of course design, the festivity element in the SEM ensures a joyful atmosphere among the team; this meets the demands of students in terms of the adaptation of team members and enables a successful experience for students when participating in sports. The teams in this study were established based on heterogeneity grouping to balance their abilities. In addition, students were asked to play diversified roles in these teams in accordance with the spirit of collaborative learning and an education of diversified values. Such a course process, which carries substantial social meaning, offers a comprehensive physical education experience for students.

4.3. Interpersonal Interaction

The SEM increased student positive peer interactions, as well as accurate self-monitoring by students of their social interactions [25]. Implications for the importance of providing specific prosocial objectives in physical education are discussed in light of this study’s findings. Moreover, the role
assignments of team members and game management in the SEM course encourage students to participate in sports and enhance interaction and communication among peers. In other words, playing different roles in competitions offers students a deeper, wider, and more positive educational sports experience. The skills, decision-making, responses, and responsibilities that students learn by playing these roles provide complete and rich fundamental experiences. Therefore, encouraging interpersonal interaction is one of the substantial efficacies of the SEM.

In summary, this quasi-experimental study clarified the efficacy of SEM in developing team cohesion in physical education. The findings seem to support the conclusion that SEM is effective. The evidence shows that students who participated in SEM improved their team cohesion. The findings of this study are meaningful in that they provide useful evidence for physical educators interested in using these teaching methods to enhance students’ team cohesion.

4.4. Limitations of the Study

The teaching design ideology of the study is to discuss if SEM could be adopted to promote students’ team cohesion. The present study employed the nonequivalent pretest-post-test quasi-experimental design; yet, difficulties were encountered during actual implementation due to factors including the difficulty of acquiring a group sample, experimental mortality, lecture hours, and course progress and budgets. The research target of this study is limited to two classes of 3rd-year students in a university in Taiwan; in actual practice, one may only carefully infer the population. Thus, I would recommend to expand the research target’s year of study, university, and area to acquire a more complete research outcome.

5. Conclusions and Recommendations

5.1. Conclusions

The current study fills a gap in the literature by investigating university students’ team cohesion in the context of physical education classes. This study revealed that SEM is a feasible approach. However, the process is filled with controversy; competition, as the goal of teaching, rendered mutual respect among peers and demonstration of team spirit while integrating personal and social responsibilities into teaching is more relevant than actual the learning outcome. Understanding sport education model lessons during planned activity is important for gauging the impact of team cohesion on the learning process. The SEM method systematically shifts the control of teaching to students for them to obtain successful experiences in sports. Thus, teachers should think outside the box and be versatile and creative when designing physical education courses. The SEM method is feasible in terms of reaching sports potential and eliciting passion from students. The results of this study led to the recommendation for physical education teachers to establish an effective team development strategy and strive to influence the cohesion of the entire class directly. The intervention design implemented in the current study provides stronger evidence of the effects of sport education model on university students’ team cohesion. These findings can be applied to other physical activities to maximize team cohesion in students.

5.2. Recommendations

5.2.1. Teaching

The research limitation of the present study was that the research targets were students from only one university. However, the results of this study showed that the application of SEM in physical education can enhance team cohesion. We hope that physical education experts and teachers can integrate diverse teaching strategies into physical education to enhance both teaching and learning effectiveness.
5.2.2. Future Studies

Future studies are recommended to test for a delayed effect after 1–2 months to observe the continued effectiveness of the SEM method on team cohesion. In addition, team cohesion was chosen as the indicator to evaluate efficacy in the present study because the aim was to determine the effect of the SEM method on the team cohesion of university students, but additional efficacy evaluation indicators can be added. For instance, students’ personal internal abilities, such as resistance to pressure, perseverance, and the leadership of team members, are research variables suitable to be efficacy indicators for future studies.

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Conflicts of Interest: The authors declare no conflict of interest.

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