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Comparison of Learning Effects of Merging TPSR Respectively with Sport Education and Traditional Teaching Model in High School Physical Education Classes

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Abstract: The purposes of the study were to examine the students' learning effects of different physical education curriculum model, which merged Teaching Personal and Responsibility (TPSR), respectively, with the Sport Education Model (SEM) and Traditional Teaching Model (TTM) for better learning effects in high school physical education classes. A pretest-posttest quasi-experimental design was used with an experimental group (TPSR-SEM; 75 students, M_{age} = 16.78 ± 0.54 years) and a control group (TPSR-SEM; 58 students, M_{age} = 16.82 ± 0.57 years). Experimental and control group sessions spanned 32 lessons over 16 weeks. Multivariate analysis of covariance was used for statistical analysis. The findings of research showed that the TPSR-SEM experimental group could improve more learning effects than the TPSR-TTM control group in the dependent variables, including sport self-efficacy, sport passion, responsibility, and game performance. We concluded that TPSR-SEM group could improve more learning effects than the TPSR-TTM group in the cognitive, psychomotor, and affective domains for physical education courses. It is worthy to develop TPSR-SEM in the physical education curriculum.

Keywords: character education; curriculum and teaching model; sport self-efficacy; sport enthusiastic

1. Introduction

Nowadays, children and adolescents face many negative social messages that influence their attitudes and behaviors. How to develop appropriate life viewpoints and life skills in the school curriculum is very important mission. What kind of curriculum model can enhance pupils' character development in physical education? Teaching Personal and Responsibility (TPSR) provides a teaching guide to develop students' affective domain in physical education, also promoting the development of personal and social responsibility [1,2]. TPSR is an alternative curriculum model, whose goals are to teach personal and social responsibility in physical education [3].

1.1. Teaching Personal and Social Responsibility Model

There are four key objectives in relation to the physical education curriculum; these pertain to the cognitive, skill, fitness, and affective domains [4]. Today, youth are exposed on a usual basis to less than empowering messages form a lot of sources (television, film, news stories, music, etc.). Every teacher has a responsibility to create an educational environment that causes a change form what is probable, to what is possible [5]. To promote sportsmanship is a common goal of school physical education, teachers and coaches play a key role in achieving this goal [6]. Jewett, Bain, and

Ennis [7] indicated that five value orientations influenced the teaching practice of physical education teachers, including disciplinary mastery, self-actualization, learning process, social reconstruction, and ecological integration. Later, in the early 1990s, social responsibility was added by Ennis and her research team to become the sixth value orientation [8]. Teachers who prioritize the social responsibility value orientation could focus on both individual development and sociocultural goals, and they believe that their main goal is to teach students personal and responsibility. Hellison [2] indicated personal and social responsibility in terms of goals: respecting the rights and feelings of others, effort and cooperation, self-direction, helping others and leadership, and transfer outside the gym. The lesson format included relational time, awareness talk, physical activity plan, group meeting, and self-reflection time. Youths should accept responsibility for their own actions and for the results of their own behaviors. They can take care of others and themselves. When we create a better learning atmosphere that supports the development of responsible attitudes and behavior, unprecedented positive results will be produced.

TPSR has generally been in the development of physical education in the United States. It is also widely used in New Zealand schools; physical teachers using the TPSR generally showed that they felt they had a strong level of confidence in their professional competence to use it successfully [9]. In recent years, many researchers implemented TPSR studies in the world, including TPSR in physical education curriculum [10–12], TPSR in sport clubs [13–15], and TPSR integrated with the sport education model [16]. These studies had some common finding that TPSR courses provide students the right to make more decisions, so that they learn to take more duty and reflection on action to develop personal and social responsibility. In the past, TPSR researches were mainly conducted on an affective domain, which are fewer on assessment of motor skill performance [17]. However, motor skill is important goal in physical education. In the further study, we need an evaluation of the motor skill performance based on the TPSR curriculum framework. Most of these studies were carried out by a single group of action research. Most of the research methods are based on the lack of objective quantitative data to measure students' change of responsible behavior. Therefore, researchers need to use quantitative research to objectively assess these learning effects regarding the cognitive, motor-skill, and affective domains in further studies [18]. In addition, TPSR could improve character development in the physical education curriculum. What kind of physical education curriculum model could be integrated with TPSR to get the best educational benefits, which is an important research gap in the current studies [17]. Therefore, it is worthy to further explore these learning effects, where the TPSR is implemented between the teacher-centered traditional teaching model and the student-centered sport education model. However, there is lack of empirical research comparing the learning effect of integrating such TPSR with other curriculum models.

1.2. Sport Education Model

The Sport Education Model is a curriculum model that is designed to provide students with authentic experiences in physical education, which was developed by Sidentop [19] in the early 1990s. In the past, American primary and secondary schools take the traditional motor skills as the core of the physical education curriculum. These traditional curricula belong in a shorter learning period for each sport or activity contents, and the repeated practice of the motor skills that often make students feel monotonous and lack of team interaction between students. Some scholars of sport pedagogy began to think about the more ideal physical education curriculum. Therefore, Siedentop's Sport Education Model gradually developed in the world [20–22]. The ultimate goal of the Sport Education Model is to make students become a competent, literate, and enthusiastic sportsperson [19]. It is difficult to develop pupils' enthusiastic in traditional teaching of physical education, but the sport education model could achieve this kind of goal [23]. The Sport Education Model is student-centered approach of education, which contains cooperative learning, game experiences of sport season, and various role tasks for students.

The current research issues regarding the Sport Education Model have been studied forward, where SEM integrated other curriculum models in order to explore the practical process and effectiveness of implementation, such as sports education integrated with the Teaching Personal and Social responsibility, Teaching Games for Understanding, and Fitness education model [24,25]. It is worth to explore which kinds of learning effects could be improved after sport education integrates with another curriculum model.

1.3. The Hybrid Model of Integrating TPSR with Sport Education Model (SEM) (TPSR-SEM)

TPSR's core feature is teaching students to assume responsibility. In the learning contexts of SEM, this emphasizes teamwork and various roles, such as the referee, captain, and others. SEM could improve more personal and social responsibility among students when compared to the traditional teaching model [26]. Teachers use SEM to accomplish the learning objectives of sports-related knowledge, motor skills, and game performance, and they use TPSR as teaching strategies to achieve the learning objectives of the affective and social behavioral domains [27]. SEM could provide a meaningful learning context to cultivate a sense of responsibility. Therefore, TPSR's integration with SEM in the physical education courses would be ideal. Hastie and Buchanan [16] developed a new curriculum model, called the "Empowering Sport model", which integrated TPSR with SEM to form a hybrid curriculum. Jewett et al. [7] proposed the ecological integration prospective of the physical education curriculum. The Empowering Sport model forms part of the ecological integration prospective, which could lead to the development of three educational domains in the physical education courses, including sport skill competence, social responsibility, and personal empowerment.

New Zealand scholar, Gordon [28], also argued that TPSR-SEM could be integrated into a hybrid model. Sport season of SEM possess a higher competition climate, which results in team conflict and antagonistic relationships. The physical educators that integrate the TPSR into SEM would reduce the tension and sense of antagonism among groups. Therefore, TPSR that merge with SEM would form a more unique and dynamic physical education curriculum. Based on theoretical viewpoints, literature has demonstrated similarities between SEM and TPSR, which could form part of hybrid model courses in physical education. For example, Hastie and Buchanan [16] pointed out that both SEM and TPSR are characteristic of the constructivist theory, and they are thus oriented towards self-guided and student-centered teaching. Students learn from each other through role duty in SEM, which enables them to practice personal and social responsibility, including respect for others, effort and cooperation, self-direction, helping others, and leadership. Moreover, the TPSR-SEM hybrid model could be considered to be the best curriculum and teaching model in physical education courses. Students could be inspired to accomplish the learning objectives of personal and social responsibility through the sport season, entailing teamwork competition in the SEM course. Hellison [1] pointed out that sport provides a good opportunity for teaching social responsibility, such as leadership, teamwork, fair play, and conflict resolution. Students could be empowered to make decisions regarding the various learning activities in SEM courses. SEM and TPSR have some common characteristics, including situational learning, constructivism, and student-centered, cooperative learning. TPSR emphasizes the affective behavioral objectives in the development of personal and social responsibility, whereas SEM focuses on the contexts of sports games. However, SEM does focus on fair play in the sport season; when integrating TPSR into SEM, students could be taught self-control, peaceful conflict resolution, and respect for others, which decreases intense interactions in game contexts. The TPSR-SEM hybrid model will facilitate the best affective attitudes and other learning performance.

Some sport pedagogy scholars have proposed feasible viewpoints regarding integrate TPSR into SEM courses. Gordon et al. [9] conducted a study in New Zealand, which found that 68.9% of teachers who used TPSR reported having taught it in combination with Sport Education. Teachers considered the merging of TPSR and Sport Education as a viable and successful option. The high percentage of teachers who had integrated TPSR into Sport Education deemed it to be highly successful for teaching in physical education. However, there has been some critique of the merging of TPSR and Sport Education.

Hastie and Buchanan [16] conducted an empirical study integrating the TPSR into SEM courses, in order to understand students' learning experiences through the hybrid model. Qualitative research methods were used and the finding of the study showed that TPSR strengthened the foundation of Sport Education. The hybrid model could be described as the Empowering Sport model that forms part of an educational perspective of ecological integration. It allows for achievement within a powerful triangle of goals-sport skill competence, social responsibility, and personal empowerment. Previous studies regarding TPSR's integration into the SEM course used pre-experimental designs and qualitative research approaches that lack experimental validity, as compared to quasi-experimental designs. Pre-experimental designs present many external threats, as some factors may influence the results, such as various sport competitions and courses on character education. Therefore, a quasi-experimental design could better examine the learning effects of TPSR's integration into the SEM course. Other previous studies have used interviews, observations, and document analysis of qualitative approach to assess the effects on students' learning. However, these could not objectively clarify the effects. Hence, the present study used the game performance assessment instrument (GPAI) and some scales to assess students' learning performance, which provided objective data facilitating an understanding of changes in students' performance in games and sense of responsibility. To date, past studies have not yet compared the learning effects of TPSR-SEM and TPSR-Traditional Teaching Model (TTM). This study explored objective variables, such as sport self-efficacy, sports passion, group cohesion, responsibility, and game performance as dependent variables, to facilitate a comparison of these changes within a hybrid model.

In summary, the purposes of the study were to compare the effects of a PE curriculum that entails TPSR-SEM and TPSR-TTM on students' learning. These learning effects included sport self-efficacy, sport passion, group cohesion, responsibility, and game performance.

2. Materials and Methods

2.1. Participants

Three physical education teachers were selected as research participants for this study. Each teacher had two classes to implement teaching activity, one class as the experimental group (TPSR-SEM) and one as the control group (TPSR-TTM). The TPSR-SEM group comprised 38 male and 37 female students (n = 75), with a mean age of 16.78 $\pm$ 0.54 years. The TPSR-TTM group comprised 30 male and 28 female students (n = 58), with a mean age of 16.82 $\pm$ 0.57 years. Sixteen weeks of physical education teaching were conducted, with two physical education classes being conducted each week. As each teacher was responsible for teaching both TPSR-SEM and TPSR-TTM, the issue of differing teaching effectiveness that is caused by teachers' teaching capabilities was eliminated, improving validity. The research ethics committee of the university approved the study and consent was obtained from parents and students.

2.2. Research Design

The present study used a quasi-experimental design with pre- and post-test on the experimental and control groups. The two groups of students underwent pre- and post-test for all dependent variables in the first and the 16th weeks. The independent variables are two kinds of different curriculum models, including TPSR-SEM and TPSR-TTM. The dependent variables were the post-test scores for sport self-efficacy, sport passion, group cohesion, and responsibility; and, game performance and covariates were the pre-test scores on these dependent variables. The teachers participating in the research attended 18 workshops with 54 lessons on physical education curriculum models, including theoretical concepts, the lesson format, and curriculum design relating to the learning activities of TPSR-SEM and TPSR-TTM. The implementing framework of TPSR has five formats in daily program format, including of relational time, awareness talk, physical activity plan, group meeting, and self-reflection time [2].

The six features of SEM, namely, seasons, affiliation, formal competition, keeping records, culminating event, and festivity mainly characterize the TPSR-SEM group (experimental group) [29]. Curricular design concepts, such as those of Sidentop et al.'s SEM, were adopted in the design of the 16-week SEM courses, which divided the students into different groups, and required them to play certain roles in the team. General learning activities were implemented based on sport season. The various course arrangements and circular competitions were conducted during regular game season, and semi-finals and finals were held after the regular games season. The champion, first runner-up, second runner-up, and fourth place candidate were awarded, respectively. Each team proposed a team name, slogan, and mascot, and students decided on the key activities and the arrangements for various competitions, under teachers' guidance. Table 1 showed the volleyball lesson plan for the TPSR-SEM group. The implementation framework of TPSR could be applied in each SEM group's lesson.

Table 1. Volleyball lesson plan of Teaching Personal and Responsibility-Sport Education Model (TPSR-SEM).

Stage	Week	Teaching Activities
Preseason	1	1. Introduce the process of implementing TPSR-SEM
		2. Divide into groups, discuss team names, and elect captains
		3. Basic skill and game concept of volleyball
	2	1. Introduce the rules of volleyball
		2. Basic skill and game concept of volleyball
		3. A small side of volleyball games
	3	1. Basic skill practice of volleyball
		2. Game strategies
		3. A small side of volleyball games
		4. Explain refereeing and practice
	4	1. Basic skill practice of volleyball
		2. Attack and defend as group strategies (2v2)
		3. Explain refereeing and practice
	5	1. Explain refereeing and practice
		2. Game strategies
		3. Understand the planning of pre-season games
		4. Attack and defend as group strategies (3v3)
		5. Explain refereeing and practice
	6	1. Practice the various basic moves
		2. Announce the fixtures schedule of pre-season games and items of attention
		3. Explain refereeing and practice
		4. Attack and defend as group strategies (4v4)
	7	1. Captains confirm the duties of each team member
		2. Captains confirm position assignment and the distribution of duties
		3. Explain refereeing and practice
		4. Explain the concepts of attack and defend
		5. Attack and defend as group strategies (6v6)
Regular season	8–15	1. Begin formal games
		2. Pre-game integrated practice of basic techniques of Volleyball
		3. Additional explanation of pre-game attack strategies
		4. Additional explanation of pre-game defend strategies
		5. Regular games based on a circular games schedule
Postseason	16	1. Post-season games (semi-final)
		2. Post-season games (final)
		3. Celebration ceremony: Top four teams of pre-season games, MVP, top scorer, improvement award, "best spirit" award

The TPSR-TTM group (control group) was taught according to Tannehill and Lund's [30] definition of TTM. It was a more generalized physical education teaching model, with the curriculum being organized in terms of traditional teaching features. Each class session included warm-ups, teaching of motor skills and game strategies, and typical small-side games, but there was no systematic arrangement of a game schedule, either pre-season or post-season. Random teams performed the group competitions within the course; therefore, there were no long-term heterogeneous teams following the cooperative learning approach. Table 2 shows the curricular content for the TPSR-TTM group. The implementation framework of TPSR could be applied in each TTM group's lesson.

Table 2. Volleyball lesson plan of TPSR-TTM.

Stage	Week	Teaching Activities
General teaching activity	1	1. Introduce the process of implementing TPSR-TTM
		2. Basic skill and game concept of volleyball
	2	1. Introduce the rules of volleyball
		2. Basic skill and game concept of volleyball
		3. A small side of volleyball games
	3	1. Basic skill practice of volleyball
		2. Game strategies
		3. A small side of volleyball games
		4. Explain refereeing and practice
	4	1. Basic skill practice of volleyball
		2. Attack and defend as group strategies (2v2)
		3. Explain refereeing and practice
	5	1. Explain refereeing and practice
		2. Attack and defend as group strategies (3v3)
		3. Explain refereeing and practice
	6	1. Practice the various basic moves
		2. Explain refereeing and practice
		3. Attack and defend as group strategies (4v4)
	7	1. Explain refereeing and practice
		2. Explain the concepts of attack and defend
		3. Attack and defend as group strategies (6v6)
General games	8–16	1. Practice of basic techniques of volleyball
		2. Additional explanation of pre-game attack strategies
		3. Additional explanation of pre-game defend strategies
		4. General volleyball games (students randomly arranged into a team each lesson)

The experimental and control groups' courses were both revised by two sport pedagogy scholars and five experts with professional knowledge and teaching experience in TPSR, SEM, and TTM, ultimately leading to the design of a curricular program. During course implementation, one session from each class of each group was recorded by video, and the two observers analyzed the recordings regarding teaching evaluation to confirm the reliability of the model. Both of the observers were quailed physical education teachers with more than eight years of experience, who conducted volleyball teaching every academic year in physical education curriculum. To determine whether the teachers' course implementation followed TPSR-SEM and TPSR-TTM requirements, we designed teaching evaluation indicators for TPSR-SEM and TPSR-TTM, based on Metzler's SEM evaluation indicators [31], Tannehill and Lund's [30] definition of TTM, and Hellison's TPSR lesson format [2]. The extent to which the first teacher's instruction fitted SEM-TPSR was evaluated by the two observers as 0.86

and 0.88, respectively, with a mean of 0.87. The degree to which the first teacher's teaching fitted TPSR-TTM was evaluated as 0.89 and 0.85, respectively, with a mean of 0.87. For the second instructor, the two observers judged the degree of teaching fitted TPSR-SEM at 0.81 and 0.85, respectively, with a mean of 0.83, and TPSR-TTM at 0.85 and 0.93 respectively, with a mean of 0.89. For the third instructor, the two observers judged the degree to which teaching fitted TPSR-SEM at 0.81 and 0.89, respectively, with a mean of 0.85, and TPSR-TTM at 0.85 and 0.93, respectively, with a mean of 0.89. All of the means reached an acceptable range of reliability above 0.80 [32]; thus, it was confirmed that the teachers' teaching behavior in this study fitted the features of TPSR-SEM and TPSR-TTM, respectively.

2.3. Research Instruments

Four scales have been applied in this present study. Three scales had been translated and validated, including Sport Self-efficacy Scale in Physical Education (SSSPE), Sport Passion Scale in Physical Education (SPSPE), Group Cohesion Scale in Physical Education (CCSPE), and Responsibility Scale in Physical Education (RSPE) was a Chinese scale for high school students.

Sport Self-efficacy Scale in Physical Education (SSSPE). The SSSPE could access students' self-efficacy in physical education. Sport self-efficacy referred to students' self-confident level of individuals' capabilities to perform their sport task in physical education. This study used the SSSPE scale that was made by Gao et al. [33], where SSSPE had one factor with six items. The SSSPE that was used in the present study had been translated into Chinese, and two focus group meetings were held to revise the items. Ten high school students were selected to complete the scale and check it well. Subsequently, the SSSEP was tested for validity and reliability through confirmatory factor analysis. The study samples comprised 342 students through purposive sampling who correctly completed the SSSPE. The result showed acceptable fit ($\chi^2_{(331)} = 744.12$, $p < 0.05$; RMSEA = 0.06, GFI = 0.92, CFI = 0.96). The average variance extracted of the latent variable was 0.63, with a composite reliability of 0.83. Thus, we concluded that the SSSPE was psychometrically sound, with adequate reliability and validity. The SSSPE comprises five items that are rated on a six-point Likert scale ranging from 6 (Strongly agree) to 1 (Strongly disagree).

Sport Passion Scale in Physical Education (SPSPE). The SPSPE could access students' sport passion in physical education, which included both components of harmonious passion and obsessive passion. Vallerand et al. [34] indicated that passion was defined as a strong inclination toward an activity that people like, that they find important, and in which they invest time and energy. Obsessive passion referred to a controlled internalization of an activity in one's identity that creates an internal pressure to engage in the activity that the person likes. Harmonious passion referred to an autonomous internalization that leads individuals to choose to engage in the activity that they like (P. 756). This study used the SPSPE with 14 items, which was based on previous scales [34]. The SPSPE in the present study had been translated into Chinese, with two focus group meetings that were held to revise the items. Ten high school students were selected to complete the scale and check it. Subsequently, the SPSEP was tested for validity and reliability through confirmatory factor analysis. The study samples comprised 342 students through purposive sampling who correctly completed the SPSPE. The result showed acceptable fit ($\chi^2_{(250)} = 473.65$, $p < 0.05$; RMSEA = 0.07, GFI = 0.91, CFI = 0.97). The average variances that were extracted of the latent variables were 0.71 and 0.75, with composite reliability of 0.85 and 0.78. Thus, we concluded that the SPSPE was psychometrically sound, with adequate reliability and validity. The SPSPE comprises 14 items, which were rated on a six-point Likert scale, ranging from 6 (Strongly agree) to 1 (Strongly disagree).

Group Cohesion Scale in Physical Education (CCSPE). The CCSPE could access students' group cohesion in physical education. Group cohesion [35] is the relationship among members in a group, which is a positive bond that exists between all group members. The CCSPE of this study had one factor with nine items, which based on previous scales [35]. In the present study, the CCSPE had been translated into Chinese, with two focus group meetings being held to revise items of scale. Ten high school students were selected to complete the scale and check it. Subsequently, the CCSEP was

tested for validity and reliability through confirmatory factor analysis. The study samples comprised 342 students through purposive sampling who correctly completed the CCSPE. The result showed acceptable fit ($\chi^2_{(305)} = 696.75$, $p < 0.05$; RMSEA = 0.07, GFI = 0.94, CFI = 0.97). The average variance that was extracted of the latent variable was 0.72, with a composite reliability of 0.84. Thus, we concluded that the CCSPE was psychometrically sound, with adequate reliability and validity. The CCSPE comprises nine items that were rated on a six-point Likert scale ranging from 6 (Strongly agree) to 1 (Strongly disagree).

Responsibility Scale in Physical Education (RSPE). The RSPE could access students' responsibility in physical education. Hsu et al. designed the RSPE [36], based on Hellison's responsibility level, subsequently developing a responsibility scale for Taiwanese high school students in physical education. The scale comprising a six-dimensional structure with 26 items (Effort, Self-direction, Following class rules, Respect for others, Helping others, and Cooperation) was constructed after the examination of content validity, item analysis, exploratory factor analysis, and internal consistency; confirmatory factor analysis and criterion related validity analysis were conducted; and, convergent validity, discriminant validity, composite reliability, and average variance extracted were also obtained. The RSPE was valid and reliable for measuring high school students' responsibility in physical education ($\chi^2_{(293)} = 617.82$, $p < 0.05$; RMSEA = 0.06; CFI = 0.91; TLI = 0.90); composite reliability (0.87, 0.82, 0.82, 0.84, 0.86, 0.84); and, average variance extracted (0.63, 0.53, 0.49, 0.57, 0.55, 0.57) were obtained.

Learning Performance. This study employed the game performance assessment instrument (GPAI) that was developed by Mitchell et al. [37], through which three game components, namely decision-making (making appropriate decisions about what to do with the ball (or projectile) during a game), skills execution (efficient execution of selected skills), and support (provision of appropriate support for a teammate with the ball (or projectile) by being in a position to receive a pass) were used as criteria to evaluate students' game performance. The mean score for these three components was the score that was used for game performance assessment.

2.4. Data Analysis

To determine the differences between the experimental and control groups in terms of sport self-efficacy, sport passion, group cohesion, responsibility, and game performance, one-way multivariate analysis of covariance (MANCOVA) was conducted, with the pre-test scores being treated as covariates and post-test scores as the dependent variables. The game performance scores were analyzed through one-way analysis of covariance (ANCOVA). The Cohen η^2 value was applied for assessing the effect [32], with $\eta^2 \geq 0.14$ indicating a higher level of effect, $0.14 > \eta^2 \geq 0.06$ indicating a medium effect, and $0.06 > \eta^2$ indicating a small effect. Statistical significance was set at $\alpha = 0.05$ for this study.

3. Results

3.1. Comparing the Effects on Sport Self-Efficacy

To determine the differences in sport self-efficacy between the TPSR-SEM experimental group and the TPSR-TTM control group, the pre-test scores of sport self-efficacy were used as covariates and the post-test scores as dependent variables. Table 3 presents the means and standard deviations of the pre- and post-test scores for the two groups on sport self-efficacy. The homogeneity of within-groups regression coefficients of the post-test scores of sport self-efficacy was tested and the result showed that $F_{(1,129)} = 1.483$, $p > 0.05$, implying that the within-groups regression coefficients were homogenous; therefore, ANCOVA was performed. As presented in Table 3, in the univariate analysis of covariance, $F_{(1,130)} = 8.985$, $p < 0.05$, and the effect size, η^2, was 0.065, indicating differences between the two teaching models regarding sport self-efficacy, and showing that the independent variable could

substantially explain the dependent variable. The sport self-efficacy of the TPSR-SEM group was better than that of the TPSR-TTM group, and the effect size was medium.

Table 3. One-way analysis of covariance (ANCOVA) for the TPSR-SEM and TPSR-Traditional Teaching Model (TTM) groups' sport self-efficacy.

	TPSR-SEM Group (n = 75)		**TPSR-TTM Group (n = 55)**			
	Mean	**Standard Deviation**	**Mean**	**Standard Deviation**	***F***	**Effect Size η^2**
Pre-test (Covariate)	4.46	0.89	4.49	0.76		
Post-test	4.88	0.82	4.55	0.72		
Post-test (adjusted)	4.89	0.08	4.54	0.09	8.985 * (p = 0.003)	0.065

* $p < 0.05$.

3.2. Comparing the Effects on Sport Passion

To determine the differences in sport passion between the TPSR-SEM experimental group and the TPSR-TTM control groups, the pre-test scores for the various aspects of sport passion were employed as covariates and the post-test scores as dependent variables. The test for homogeneity of within-groups regression coefficients showed that the F-value of two variables were not significant ($p > 0.05$); therefore, the hypothesis of the MANCOVA was not refuted and ANCOVA was conducted. As shown in Table 4, the results of the MANCOVA showed that the overall Wilk's λ value was 0.952 ($p < 0.05$), reaching significance, and univariate ANCOVA then followed. After excluding the effect of covariates, the univariate testing of the experimental and control groups on the various aspects were compared. The two groups showed significant differences in terms of harmonious passion ($F_{(1,130)} = 5.39$, $p < 0.05$) and obsessive passion ($F_{(1,130)} = 4.08$, $p < 0.05$), with the effect size η^2 of these components being 0.040 and 0.031, respectively. Therefore, it may be concluded that the TPSR-SEM group was significantly better than the TPSR-TTM group regarding sport passion, and both of the components had a small effect size.

Table 4. One-way multivariate analysis of covariance (MANCOVA) for the TPSR-SEM and TPSR-TTM groups' sports passion.

	TPSR-SEM Group (n = 75)		**TPSR-TTM Group (n = 55)**				
	Mean	**Standard Deviation**	**Mean**	**Standard Deviation**	**Multivariate Wilk's λ**	***F***	**Effect η2**
Pre-test (Covariate)							
1. Harmonious passion	4.73	0.76	4.79	0.77			
2. Obsessive passion	4.23	0.74	4.15	1.00			
Post-test							
1. Harmonious passion	4.98	0.95	4.75	0.76			
2. Obsessive passion	4.44	0.99	4.10	0.96			
Post-test (adjusted)	Mean	Standard error	Mean	Standard error			
1. Harmonious passion	4.98	0.07	4.73	0.10	0.952 *	5.39 * (p = 0.022)	0.040
2. Obsessive passion	4.43	0.08	4.12	0.11	(p = 0.043)	4.08 * (p = 0.045)	0.031

* $p < 0.05$.

3.3. Comparing the Effects on Group Cohesion

To determine the differences in group cohesion between the TPSR-SEM experimental group and the TPSR-TTM control group, the pre-test scores of group cohesion were used as covariates and the

post-test scores as dependent variables. Table 5 presents the means and standard deviations of the pre- and post-test scores for the two groups on group cohesion. The homogeneity of the within-groups regression coefficients of the post-test scores of group cohesion was tested, and $F_{(1,129)} = 0.241$, $p > 0.05$, implying that the within-groups regression coefficients were homogenous; therefore, ANCOVA was performed. As shown in Table 3, in the univariate analysis of covariance, $F_{(1,130)} = 3.15$, $p > 0.05$, indicating the differences between the two teaching models regarding group cohesion, and showing that the independent variable could substantially explain the dependent variable. The group cohesion of the TPSR-SEM group was not better than that of the TPSR-TTM group; the two groups experienced a similar learning effect regarding group cohesion.

Table 5. ANCOVA of the TPSR-SEM and TPSR-TTM groups' group cohesion.

	TPSR-SEM Group (n = 75)		**TPSR-TTM Group (n = 55)**			
	Mean	**Standard Deviation**	**Mean**	**Standard Deviation**	***F***	**Effect Size η^2**
Pre-test (Covariate)	4.80	0.85	4.89	0.86		
Post-test	5.00	0.69	4.84	0.80		
Post-test (adjusted)	5.02	0.07	4.82	0.08	3.15 (p = 0.078)	0.024

3.4. Comparing the Effects on Responsibility

To determine the differences between the TPSR-SEM experimental group and TPSR-TTM control groups regarding students' responsibility, the pre-test scores for the various aspects of sport passion were employed as covariates and the post-test scores as dependent variables. The test for homogeneity of the within-groups regression coefficients showed that the *F*-values of the two variables were not significant ($p > 0.05$); therefore, the hypothesis of MANCOVA was not refuted and ANCOVA was conducted. As shown in Table 6, the results of the MANCOVA showed that the overall Wilk's λ value was 0.763 ($p < 0.05$), reaching significance, and univariate ANCOVA followed. After excluding the effect of covariates, univariate testing of the experimental and control groups on the various aspects was compared. The two groups showed significant differences in terms of effort ($F_{(1,130)} = 5.279$, $p < 0.05$), self-direction ($F_{(1,130)} = 8.574$, $p < 0.05$), and cooperation ($F_{(1130)} = 4.375$, $p < 0.05$), with the effect size η^2 of these components at 0.041, 0.064, and 0.034, respectively. Therefore, it may be concluded that the TPSR-SEM group was significantly better than the TPSR-TTM group in these three components. Self-direction had a medium effect size, and effort and cooperation had small effect sizes.

Table 6. MANCOVA of TPSR-SEM and TPSR-TTM groups' responsibility.

	TPSR-SEM (n = 75)		**TPSR-TTM (n = 55)**				
	Mean	**Standard Deviation**	**Mean**	**Standard Deviation**	**Multivariate Wilk's λ**	***F***	**Effect η^2**
Pre-test (Covariate)							
1. Effort	4.72	0.73	4.70	0.87			
2. Self-direction	4.76	0.78	4.55	0.91			
3. Following class rules	5.29	0.74	5.13	0.69			
4. Respect	5.12	0.75	4.86	0.78			
5. Helping others	4.79	0.69	4.71	0.69			
6. Cooperation	4.91	0.76	4.76	0.78			

Table 6. *Cont.*

	TPSR-SEM (n = 75)		TPSR-TTM (n = 55)				
	Mean	**Standard Deviation**	**Mean**	**Standard Deviation**	**Multivariate Wilk's λ**	***F***	**Effect η^2**
Post-test							
1. Effort	4.95	0.83	4.77	0.77			
2. Self-direction	4.97	0.68	4.58	0.93			
3. Following class rules	5.27	0.79	5.36	0.74			
4. Respect	5.08	0.76	4.98	0.69			
5. Helping others	4.79	0.69	4.83	0.72			
6. Cooperation	4.95	0.82	4.94	0.76			
Post-test (adjusted)							
1. Effort	4.94	0.06	4.78	0.07	0.763 *	5.279 * p = 0.023	0.041
2. Self-direction	4.87	0.05	4.69	0.06	p = 0.000	8.574 * p = 0.004	0.064
3. Following class rules	5.21	0.08	5.21	0.05		1.412 p = 0.237	0.011
4. Respect	4.98	0.07	4.99	0.06		3.492 p = 0.064	0.027
5. Helping others	4.75	0.08	4.75	0.08		2.523 p = 0.115	0.020
6. Cooperation	4.88	0.06	5.01	0.07		4.375 * p = 0.038	0.034

* $p < 0.05$.

3.5. Analyzing the Effect on Game Performance

Table 7 presents the means and the standard deviations of the pre- and post-test scores for the two groups on game performance. The homogeneity of within-groups regression coefficients of the post-test scores of game performance was tested, $F_{(1,129)} = 1.374$, $p > 0.05$), implying that the within-groups regression coefficients were homogenous; therefore, ANCOVA was performed. As presented in Table 6, in the univariate analysis of covariance, $F_{(1,130)} = 79.155$, $p < 0.05$, and the effect size η^2 was 0.378, indicating the differences between the two teaching models regarding game performance and showing that the independent variable could substantially explain the dependent variable. The game performance of the TPSR-SEM group was better than that of the TPSR-TTM group, and the effect size was strong.

Table 7. ANCOVA of TPSR-SEM and TPSR-TTM groups' game performance.

	TPSR-SEM Group (n = 75)		TPSR-TTM Group (n = 55)			
	Mean	**Standard Deviation**	**Mean**	**Standard Deviation**	***F***	**Effect Size η^2**
Pre-test (Covariate)	61.08	8.30	56.84	11.91		
Post-test	65.32	7.79	60.59	12.11		
Post-test (adjusted)	76.00	7.21	66.33	12.24	79.155 * (p = 0.000)	0.378

* $p < 0.05$.

4. Discussion

In relation to some independent variables, including sport self-efficacy, sport passion, responsibility, and game performance, the experimental group (TPSR-SEM) demonstrated better learning effects than the control group (TPSR-TTM). In terms of sport self-efficacy, the TPSR-SEM group displayed

better learning effects than the TPSR-TTM group did, and the effect size was medium (η^2 = 0.065). In terms of game performance, the TPSR-SEM group showed better learning effects than those of the TPSR-TTM group, and the effect size was strong (η^2 = 0.378). The above findings showed that some key features in the TPSR-SEM group, such as sport season and formal competition, motivate students to invest more effort, so as to perform better in a game. Therefore, students' sport self-efficacy and game performance could show better improvement in the TPSR-SEM group than in the TPSR-TTM group. Teenagers often enjoy competition in physical activities. The sport education model includes many formal competitions to facilitate students' motivation in physical education.

In terms of sport passion, the TPSR-SEM group demonstrated significantly better learning effects than the TPSR-TTM group, and both components of harmonious passion and obsessive passion had a small effect size (η^2 = 0.040 and 0.031). In the TPSR-SEM course, the students often participated in formal competition in the SEM season, which could inspire their passion in sport. In terms of responsibility, the TPSR-SEM group showed significantly better learning effects than the TPSR-TTM group in three components did, namely, self-direction, effort, and cooperation. Self-direction had a medium effect size (η^2 = 0.064), and effort (η^2 = 0.041) and cooperation had a small effect size (η^2 = 0.034). Based the findings of past researches [10–12], TPSR could develop value and life skill in physical education. SEM is primarily based on a competition context, and sometimes games are elevated to a higher competitive condition and teammates expect to win games, meanwhile it reduces students' prosocial behavior and increases antisocial behavior [18]. How can the negative effects of competitive contexts in SEM be prevented? TPSR would be ideal in alleviating SEM's competitive atmosphere. Thus, the integration of TPSR with SEM in physical education courses would be ideal [16]. Generally speaking, teachers guide students to understand an awareness of personal responsibility, including goal-setting, self-motivation, exploration of effort and new tasks, and guide students to practice responsibility in physical activity. On the other hand, social responsibility contained the right to be included and to have cooperative peers, right to peaceful conflict resolution, caring, and compassion, which is not only a process goal, but also one of the main goals, leading to the development of motor skill, game strategy, or game performance [38]. With the cooperative learning approach and empowerment in TPSR-SEM courses, students have to play various roles to carry out duties on their own. Therefore, TPSR-SEM could facilitate better development in effort, cooperation, and self-direction.

In terms of group cohesion, the TPSR-SEM and TPSR-TTM groups had a similar learning effect. It is worth exploring for group cohesion between the experimental and control groups that why it had no significant difference in this component. Generally, TPSR-SEM could improve more group cohesion than TPSR-TTM, because SEM had the "affiliation" component to develop teamwork through the whole sport season. We can see group cohesion in Table 5, the means of TPSR-SEM group increased from pre-test to post-test, but the TPSR-TTM group declined from pre-test to post–test. In the future, longitudinal studies could be designed to examine the effects between the experimental and control groups in the physical education lesson.

It was difficult to achieve the same positive learning atmosphere in the traditional teaching model, when compared to that experienced by students when they felt passionate during implementation of the sports education model [27]. This type of learning atmosphere enhanced students' active participation in physical education courses. There were some advantages in the traditional teaching model, such as greater facilitation of basic motor skills, more time to develop basic movement ability, and a small side game among groups before the completion of lessons, to increase sport enjoyment. However, when compared to the sport education model, the traditional teaching model lacked teamwork processes and the formal competition of a hierarchical structure, which could not facilitate students' motivation. When integrating TPSR into SEM, students could develop more interest in the sport season, with team competition inspiring their sport motivation. On the other hand, integrating TPSR into TTM, which did not have formal competition during sport season, the development of the spirit of teamwork was difficult, because students did not have their own

competing team. In TPSR-SEM courses, team affiliation improved learning activities and applied formal competition motivated students' sport participation. Hastie [38] pointed out that integrating TPSR into SEM become the Empowering Sport model, which is a new research issue that is based on a student-centered educational approach for sport pedagogy. After integrating TPSR into SEM, students experienced more learning motivation, teamwork, and game performance, demonstrating better learning effects when compared to when TPSR was integrated into the traditional teaching model. SEM empowers students to learn a variety of roles in sports, and entailed a longer season, formal competition, and team affiliation as cooperative learning, with team affiliation possibly promoting social interactions. SEM provides an authentic sports experience and it is an educational approach that entails situational learning [21]. In summary, SEM has a more structural learning process in physical education teaching [28]. In physical education, SEM-TPSR contained a kind of indirect teaching styles and instructional models, in which students need to build a team to work together in order to achieve a common goal.

It is important that physical educators need to organize activities and games in order to meet individual's ability levels and create opportunities for students to have a meaningful relationship with partners [39], which could develop basic psychological needs and promote students' self-determined motivation. Integrating TPSR into SEM is a better model to improve students' learning effects for sport competence and the affective domain in physical education. In current study, it had also some limitations, including short experimental time, and not yet examining students' responsibility out of gym. We examined the short-term effects of students' learning performance in 16-week program. In further study, researchers could conduct long-term observation spanning 1–3 years, in order to understand the students' longitudinal impact of cognitive, psychomotor, and affective domains in physical education. Most difficult of all is transferring these values and skills outside the gym in TPSR, where the environment is often less supportive [2]. The present study did not also explore the learning effects regarding transferring these responsibilities to outside of the gym. Thus, based on the levels of TPSR, we focused on level 1 to level 4, from respect, effort, and cooperation, self-direction to leadership, and helping others. In further study, researchers could design an TPSR program to examine the learning effect for level 5, transfer outside the gym, and to understand how responsibility transfer outside the gym could be developed in TPSR. Otherwise, researchers could also explore combining TPSR with other models except sport education, for example, fitness education, teaching games for understand, motor skill, and so all, which could understand learning effects that are integrated TPSR with different curriculum and teaching model.

5. Conclusions

The conclusions showed that TPSR-SEM could improve learning effects more substantially than TPSR-TTM in the physical education curriculum, which included sport self-efficacy, sport passion, responsibility, and game performance. It meant that the hybrid TPSR-SEM model improved the better development in sport competence and affective domain, which could be applied in physical education. This finding of research indicated that TPSR integrated with the sport education model could improve more learning effects, which provided an evidence-based program to be applied in real educational situation. It is an important implication in this study that combined cooperation learning, ideal competition context, and responsibility teaching could create a quality physical education curriculum.

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