

Evaluating the Effectiveness of Applying “Learning to Live Together” to a Physical Education Program: Focusing on the Physical Fitness Unit for First-Year High-School Students in Japan

Kazuki FUJII*¹, Satoshi OTOMO*², Naohiro FUKADA*³,
Takehito YOSHII*⁴, Ryosuke TAKATA*⁵

Abstract:

The concept of “Learning to Live Together” (hereafter, LT), as outlined in UNESCO’s Learning: The Treasure Within (Delors et al. 1996). Despite its global significance, integrating LT into education faces challenges, including limited instructional time and difficulty in measuring outcomes. Physical education has been identified as a promising medium for teaching LT, but empirical studies in this area remain scarce.

This study developed a physical education program, the Program of Learning to Live Together in Physical Education (hereafter, PLT-PE), based on UNESCO’s dual learning process—“Discovering Others” and “Working Towards Common Objectives.” The program was implemented in a seven-hour “Physical Fitness” unit for Japanese high school students. Two metrics were used for evaluation: LT Factor scores (Fujii et al. 2022; 2024) and other competencies measured using Kikuchi’s Scale of Social Skills (hereafter, KiSS-18).

While no significant improvement in LT Factor scores or KiSS-18 scores was observed across all participants, subgroup analysis revealed distinct trends. Students were classified into three groups—Improved, Unchanged, and Decreased—based on changes in their LT factor scores. Subsequent analysis revealed that part of the effects of PLT-PE became evident. Furthermore, later examinations suggested the presence of a non-linear learning phase in the LT Factor scores and KiSS-18 scores.

This study developed a PLT-PE based on UNESCO’s dual learning process and evaluated its effects. As a result, some positive outcomes were observed. The relationship between LT and “Other Competencies” remains unclear and requires further study.

Keywords: *Social skills, sports education, communication, inclusive, humanity*

*¹ Faculty of Education, Ikuei University; Graduate School of Sport and Health Science, Ritsumeikan University.

*² College of Sport and Health Science, Ritsumeikan University.

*³ Faculty of Education and Welfare, Biwako-Gakuin University.

*⁴ Faculty of Education, Ikuei University.

*⁵ Kansai University.

Email: fujii@ikuei-g.ac.jp

Received on 2025/1/14, accepted after peer reviews on 2025/8/8.

1. Introduction

(1) “Learning to Live Together”

UNESCO published its report “Learning: The Treasure Within” (Delors et al. 1996) in 1996. The report identifies the four pillars of education: “Learning to Know,” to acquire the means of understanding; “Learning to Do,” to act creatively in one’s environment; “Learning to Live Together,” (hereafter, LT) to participate and cooperate in all activities; and “Learning to Be” as a process that inevitably derives from the other three pillars (Delors et al. 1996). Among these four pillars of learning, about LT, it is emphasized that: “This question has become even more crucial to answer given the divides and inequities that were exacerbated by the pandemic” (Deardorff 2023).

LT is specifically defined as “developing an understanding of other people and an appreciation of interdependence—carrying out joint projects and learning to manage conflicts—in a spirit of respect for the values of pluralism, mutual understanding and peace” (Delors et al. 1996).

(2) LT in Global Context

The UNESCO report “Learning to Live Together: Education Policies and Realities in the Asia-Pacific” examined how the concept of “Learning to Live Together” (UNESCO Office Bangkok and Regional Bureau for Education in Asia and the Pacific 2014) is reflected in the education systems of ten Asian countries. The report discussed LT and related subjects. The analysis of subjects and activities with potential for LT revealed that physical education was positioned as a subject potentially related to LT in primary and secondary education across six countries. Whereas the report states that “[...] subjects and activities with potential for LT are allocated the least time in the classroom as opposed to traditional subjects such as language, mathematics and science.”

This limited instructional time raises concerns about opportunities to foster students’ social development through such subjects. In a broader international context, the importance of physical education for social learning has also been recognized. For instance, the UNESCO report states, “Appropriate physical education provision can have a strong, positive effect on students’ social skills and social development. Strong social skills are set to emerge as critical in the world of tomorrow” (OECD 2019), suggesting that physical education is a particularly suitable subject for teaching LT.

(3) LT in Japan

In Japan, courses of study are established as standards for organizing curricula in each school to ensure that students receive a certain level of education. Courses of study guidelines were revised for elementary schools and junior high schools in 2017, and high schools in 2018. These revised Courses of Study stipulate “Acquiring Knowledge and Skills,” “Thinking, Making Judgements and Expressing,” and “Cultivating the Motivation to Learn and Humanity” as the three qualities and abilities that students are expected to develop (MEXT 2017a; 2017b; 2018).

LT is categorized as “Cultivating the Motivation to Learn and Humanity.” Furthermore, according to Okade (2017), LT is a new goal and instructional content listed in these revised Courses of Study. In addition, according to Otomo (2017), it is necessary to promote the teaching of LT in physical education. From the educational trends observed in Asia and Japan, the following two points have been clarified: 1) It was suggested that physical education is effective in teaching LT. 2) It has been pointed out that subjects and activities with potential for LT are allocated limited instructional time.

Accordingly, the purpose of this study is to develop a physical education program for LT and then

to confirm its effects through student evaluation.

2. Literature Review

(1) Previous Study

Previous studies that applied the concept of LT to physical education classes and examined its effectiveness were not found.¹ In this study, the term “Inclusive,” closely aligned with the concept of LT, was used to review previous studies. Previous studies that applied the concept of “Inclusive” to physical education classes and examined its effectiveness observed the following trends. Firstly, several studies investigated teachers’ knowledge, lesson planning, or beliefs regarding physical education classes incorporating inclusive content (Grenier 2011; Hagiwara et al. 2023; Li and Chen 2011; Li and Sam 2011; Morley et al. 2005; Nanayakkara 2021; Park et al. 2014; Wang et al. 2015; Yarım kaya and Rizzo 2020). Secondly, research examined the effectiveness of teaching methods and projects in physical education incorporating inclusive content (Klavina 2008; Klavina and Block 2008; Lieberman et al. 2000; Schleien et al. 1988; Tubić and Djordjic 2012; Wiskochil et al. 2007). Thirdly, studies explored students’ awareness, friendships, or perspectives in physical education classes incorporating inclusive content (Donna and Jane 2000; Joan et al. 2003; Li et al. 2022; Nemček and Wittmannová 2021; Průžek et al. 2020; Seymour et al. 2009).

However, the instructional methods related to LT observed in previous studies are based on the premise of a dichotomous relationship, such as between non-disabled and disabled individuals. In other words, these instructional methods cannot be applied if the dichotomous relationship mentioned above is not present among the students receiving the lessons. For this reason, it is necessary to develop a physical education program that can be applied to all classes.

Furthermore, previous studies have also examined existing physical education models from an inclusive perspective. For example, Cooperative Learning (hereafter, CL) is an instructional strategy that organizes students into small, heterogeneous groups to promote collaborative engagement in physical activity (Dyson 2001). It has been reported to enhance students’ social skills and sense of responsibility (Bores-García et al. 2021; Casey and Goodyear 2015; Dyson 2002), and the number of studies on CL has been increasing in recent years (Iglesias et al. 2023). From an inclusive standpoint, however, CL has shown mixed results. While one study reported no significant improvements in gender equality attitudes (Bofill-Herrero et al. 2022), others have demonstrated its potential to increase peer acceptance among SEGPA students (André et al. 2011) and to facilitate the realization of inclusive physical education involving students with disabilities (Kim and Park 2024).

Another pedagogical model, the Teaching Personal and Social Responsibility model (hereafter, TPSR), is designed to foster personal and social responsibility among youth (Hellison 2011). Its effectiveness in promoting social and personal responsibility as well as sportsmanship in physical education has been reported (Navarro-Talón et al. 2024; Sánchez-Miguel et al. 2025; Shen et al. 2022). From an inclusive perspective, TPSR has been found to contain elements that promote cultural sensitivity; however, it has also been criticized for limiting its focus to gender and ethnicity (Pinkerton and Martinek, 2023).

1 Previous studies that transferred LT to physical education classes were researched using the following paper search databases. For Japanese papers, “CiNii Research” and “J-STAGE” were used, and for English papers, “SPORTDiscus™ with Full Text” was used. The search words used were “Physical education” and “LT.”

The Sport Education Model (hereafter, SEM), which is defined as “a curriculum and instruction model designed to provide authentic, educationally rich sport experiences for girls and boys in the context of school physical education” (Siedentop 2002), has also shown positive effects on multiple indicators related to social competence (Wang and Chen 2021). Studies investigating SEM from an inclusive perspective suggest that combining it with Paralympic School Day can provide opportunities for fostering empathy, mutual understanding, and collaborative learning (De Luna et al. 2023). While SEM can offer meaningful experiences to students with disabilities, concerns have been raised that its emphasis on meritocracy and competition may limit its inclusivity (Malinowski et al. 2024).

These previous studies have primarily addressed explicit differences such as disability and gender. However, implicit differences, such as cultural backgrounds and values, have not been sufficiently explored. In Japan, where cultural and racial diversity tends to be lower compared to other countries, it remains a challenge to make such implicit differences visible and to use them as opportunities for learning about coexistence.

One possible explanation is that, for example, CL is structured around five basic principles—positive interdependence, individual accountability, promotive interaction, social skills training, and group processing (Johnson et al. 2010)—but does not include activities aimed at helping students discover and reflect upon differences between themselves and others. As a result, it is likely that CL tends to focus only on more visible differences, such as disability or gender. In contrast, the dual learning process includes activities explicitly designed to identify differences between oneself and others. Therefore, incorporating this process may help visualize implicit differences and activate learning opportunities related to coexistence.

(2) Instruction on LT

Delors, J. et al. (1996) suggested dual processes for LT (hereafter, dual learning process) The first is “Discovering others” defined as “Realizing at one and the same time, the diversity of the human race and developing an awareness of the shared similarities and understanding the interdependence of all humans” (Delors et al. 1996).

The second is “Working towards common objectives,” described as: “When people work together on rewarding projects which take them out of their usual routine, differences and even conflicts between individuals tend to fade into the background and sometimes disappear” (Delors et al. 1996). Furthermore, the dual learning process is described as “[...] development of empathy, cultural sensitivity, acceptance, communication skills, teamwork and leadership, among other competencies” (UNESCO Office Bangkok and Regional Bureau for Education in Asia and the Pacific 2014). The dual learning processes for LT suggest not only an enhancement of LT itself but also the potential to improve other competencies, indicating a ripple effect. These dual processes are closely related to what the Japanese Course of Study defines as “Cultivating the Motivation to Learn and Humanity” (MEXT 2018).

The guideline given in such reports is stated as, “Above all, it is the pillar LT that has informed the international dimension of recent curriculum developments” (Scatolini et al. 2010). The dual learning process described in the report is not premised on a dichotomous relationship, such as between non-disabled and disabled individuals. In other words, it is thought that a physical education program that applies the dual learning process is effective regardless of the student’s situation, such as between non-disabled and disabled individuals.

On the other hand, according to Draxler (2010), “Hard facts about the impact of such reports are

very limited,” and practical research has not been thoroughly explored.

The following two reasons have been shown to be factors in this situation. First, LT is a necessary concept, but it is “more philosophical than directly practical” (Draxler 2010). Second, “[...] such programs may have lower status than other curriculum areas and are less easily accessed through conventional means such as examination results or access to jobs, careers or higher education” (Sinclair et al. 2008). For this reason, it is considered necessary to promote practical research and clarify the effectiveness of instruction on LT.

While such challenges exist, the dual learning process is nonetheless aligned with key educational goals both in Japan and in global policy discourse. A correspondence can be observed between the dual learning process and the Japanese Course of Study’s concept of “Cultivating the Motivation to Learn and Humanity.” This domain comprises seven components: positive attitude, equity, responsibility, cooperation, living together, participation, and health and safety. Since the dual learning process is a mechanism for fostering LT, it closely aligns with how LT is conceptualized in the Course of Study.

For example, “Working towards common objectives” is associated with participation, described as “contributing to consensus building” (MEXT 2018). Teamwork cultivated through the dual process corresponds with cooperation, defined as “helping and improving together,” while leadership with a sense of responsibility corresponds with responsibility, defined as “taking on roles proactively and fulfilling one’s responsibilities” (MEXT 2018).

Moreover, the dual learning process is consistent with international educational trends. The OECD’s Future of Education and Skills 2030 framework positions well-being as a key goal and emphasizes agency as a critical concept. It identifies “Creating new value,” “Reconciling tensions and dilemmas,” and “Taking responsibility” as transformative competencies, in addition to knowledge, skills, attitudes, and values (OECD 2018).

Notably, “Working towards common objectives,” which is described as a process in which “differences and even conflicts between individuals tend to fade into the background,” closely corresponds to “Reconciling tensions and dilemmas” in the OECD framework. Taken together, the dual learning process shows strong alignment with both Japan’s national educational goals and global trends in transformative learning.

Accordingly, the purpose of this study is to develop a physical education program by applying a dual learning process for LT, which the author names “Program of LT” (hereafter, PLT-PE) and then to confirm its effects through student evaluation.

In the physical education curriculum, there are seven designated content areas: “Physical Fitness,” “Gymnastics,” “Track and Field,” “Swimming,” “Games,” “Martial Arts,” and “Dance.” Among these, “Physical Fitness” is the only area mandated across all grade levels. In light of its curricular importance, this study focused on the “Physical Fitness” unit. Furthermore, as the continuity of learning between junior high and senior high school has been identified as an educational issue (MEXT 2010), this study targeted first-year students at a prefectural public high school.

(3) Research Question Setting

From this review of the existing research, it can be understood that the effects of LT on the dual learning process, “Discovering others” and “Working towards common objectives,” are not yet clear. Therefore, this study has set the following two research questions. 1) Does the dual-learning process improve LT scores in students’ evaluations? 2) Does the dual-learning process improve “other

competencies” (UNESCO Office Bangkok and Regional Bureau for Education in Asia and the Pacific 2014) scores in students’ evaluations?

3. Methodology, Theory, and Sources

(1) Examinees and Terms

This study targeted PE classes with 211 1st-grade prefectural public high school students in Shiga. The intervention period was in April 2024.

(2) Settings and Instruction Methods of the PLT-PE

Figure 1 presents the unit plan for the physical education lessons conducted in this study. In this research, the dual-learning process was applied to a 7-hour “Physical Fitness” unit. “Physical Fitness” consists of “Physical Release and Fitness” and “Plan for Real-life Fitness.” The following four specifics have been established in the “Physical Fitness” content. 1) Accepting your own and others’ minds and bodies, 2) Experiencing the joy and comfort of physical activity, 3) Relaxing mind and body, and 4) Learning how to enhance body movement (MEXT 2018). In the “Physical Fitness” unit of this study, “Physical Release and Fitness” was covered in the first half of the unit, and “Plan for Real-life Fitness” was covered in the second half. In “Physical Release and Fitness,” activities were set up to enable working with peers, specifically, exercises such as those used in icebreakers with hula hoops and combined dash and tic-tac-toe exercises. In “Plan for Real-life Fitness,” activities were set up to plan the exercise and present it. Specifically, the following were done. 1) Selecting the exercise category for the preparation exercise, 2) Brainstorming about the Preparation Exercise from experience, 3) Selecting a preparatory exercise corresponding to the selected exercise category from number two, 4) If not decided in number two, a preparatory exercise was researched using the Internet, 5) Preparing for presentation and 6) Presentation with demonstrations of the characteristics of the preparatory exercise and its aims. The LT learning process was applied to the “Physical Exercise” unit

			Unit Time							
			1		2	3	4	5	6	7
			Physical Release and Fitness			Plan for Real-Life Fitness				
			Discovering Others			Experience of Shared Purposes				
Time in Minutes	0	5	Orientation	Preparation Exercise		What is “Preparatory Exercises”	Preparation Exercise			
	5	10		Dash and tic-tac-toe (1on1)	Explanation		Confirmation of Tasks			
	10	15	Stand up with your back straight!	Dash and Nervous Breakdown (1on1)	Dash and Poker (1)	Select the Exercise Category 1)	Consideration of Preparation Exercise			
	15	20								
	20	25	Helium Ring	Talk Together (About similarities and differences)		Brainstorming about Preparation Exercise 2)	Planning for Presentation	Rehearsal for Presentation	Presentation	
	25	30	Pass-through Hoop							Categorize the Preparatory Exercises 3)
	30	35	Dash and tic-tac-toe (team game)	Explanation	Research about Preparation Exercise 4)					
	35	40	Hula hoop Removal	Dash and Nervous Breakdown (team game)		Dash and Poker (2)				
	40	45								
	45	50	Reflection							

Figure 1. Unit Plan

Source: Author

above. “Discovering others” was set up in the first half of the unit. Specifically, the group members shared the similarities and differences they noticed between themselves and others through the classes. “Working towards common objectives” was set up in the second half of the unit. Specifically, “Plan preparatory exercises” was set as “Working towards common objectives.”

(3) Investigated Items

1) Investigated Items of LT

In this study, the “Japan Physical Education Evaluation Scale of Cultivating the Motivation to Learn and Humanity”: 10 items created by Fujii et al. (2022; 2024) were employed. The ten items were evaluated under four factors: 1) “Responsibility and Equity through Physical Exercise,” 2) “Living Together through Physical Exercise” (hereafter, LT Factor), 3) “Health and Safety through Physical Exercise,” and 4) “Cooperating through Physical Exercise.” Among them, the LT Factor is the factor corresponding to LT. Therefore, in this study, three items included in the LT Factor were included in the analysis. Specifically, the three items were as follows. “I exercise with the awareness that there is a suitable practice for each of my colleagues,” “I notice the differences in each of my colleagues and practice accordingly” and “I exercise with respect to the differences in fitness and movement of each of my fellow members” About the answer choices, using five options from “I never do” to “I always do.”

2) Scale of Social Skills

In this study, Kikuchi’s Scale of Social Skills (hereafter, KiSS-18) was employed for measuring “Other Competencies.” KiSS-18 consists of 18 items. About the answer choices, using five options from “Yes, always,” to “No, never.” In the KiSS-18, social skills are defined as abilities that facilitate smooth interpersonal relationships (Kikuchi 2004).

4. Results

First, a Wilcoxon signed-rank test was conducted on the pre- and post-unit scores of the LT factor score and the KiSS-18 score. As a result, no significant changes were observed in the pre- and post-unit “LT Factor score” ($Z=0.66$, n.s.) and KiSS-18 score ($Z=1.15$, n.s.).

Second, three groups of students were identified. Students whose LT Factor score improved, students whose LT Factor score was unchanged, and students whose LT Factor score decreased were identified. Based on this, participants were classified into three groups: the Improved group, the Unchanged group, and the Decreased group.

Next, a Wilcoxon signed-rank test was conducted on the pre- and post-unit scores of the LT Factor score and the KiSS-18 score.

(1) LT Factor Score (Table 1) <Does the dual-learning process improve LT scores in students’ evaluations?>

1) LT Factor score in the Improved group

The post-unit LT Factor score was significantly higher compared to the pre-unit score ($Z=-7.26$, $p<0.001$).

2) LT Factor score in the Unchanged group

The post-unit LT Factor score was not significant ($Z = 0.00$, n.s.).

3) LT Factor score in the Decreased group

The post-unit LT Factor score was significantly lower compared to the pre-unit score ($Z = -7.3753$, $p < 0.001$).

Table 1. Number of Participants, Mean, Standard Deviation, Percentile, and Z-Score of LT Factors by Group (Improved, Unchanged, Decreased) and Pre-Post Measurements

Group	N	Pre						Post						Test
		M	SD	Percentile			M	SD	Percentile			Statistic Z score		
				25	50	75			25	50	75			
LT factor Score in Improved group	69	3.34	0.77	3.00	3.33	4.00	4.29	0.75	3.67	4.33	5.00	-7.26 ***		
LT factor Score in Unchanged group	62	4.49	0.71	4.00	5.00	5.00	4.49	0.71	4.00	5.00	5.00	0.00 n. s.		
LT factor Score in Decreased group	70	4.14	0.82	3.67	4.33	5.00	3.28	0.96	2.67	3.33	4.00	-7.37 ***		
***= $p<.001$, n. s. = not significant														

***= $p < .001$, n. s. = not significant

Source: Author

(2) KiSS-18 Score (Table 2) <Does the dual-learning process improve “other competencies” scores in students’ evaluations?>

1) KiSS-18 score in the Improved group

The post-unit KiSS-18 score was also significantly higher compared to the pre-unit score ($Z = -2.76$, $p < 0.01$).

2) KiSS-18 score in the Unchanged group

The post-unit KiSS-18 score was not significant ($Z = 0.70$, n.s.).

3) KiSS-18 score in the Decreased group

The post-unit KiSS-18 score was not significant ($Z = -1.39$, n.s.).

Table 2. Number of Participants, Mean, Standard Deviation, Percentile, and Z-Score of KiSS-18 by Group (Improved, Unchanged, Decreased) and Pre-Post Measurements

Group	N	Pre						Post						Test Statistic Z score
		M	SD	Percentile			M	SD	Percentile					
				25	50	75			25	50	75			
KiSS-18 Score in Improved group	69	59.06	9.82	52.50	59.00	65.00	62.10	11.32	54.00	61.00	70.50	-2.76 **		
KiSS-18 Score in Unchanged group	62	68.42	12.93	59.00	68.00	80.25	68.56	12.40	60.00	69.00	77.00	0.70 n. s.		
KiSS-18 Score in Decreased group	70	60.57	11.40	54.75	60.00	69.00	58.86	10.76	54.00	58.00	64.75	-1.39 n. s.		

**= $p < .01$, n. s. = not significant

Source: Author

5. Discussion

(1) The LT Factor Score and KiSS-18 Score of All Participants

This study posed two research questions: 1) Does the dual-learning process enhance LT scores in student evaluations? 2) Does the dual-learning process improve “other competencies” scores in student evaluations? Analysis across all participants showed no significant improvement in either LT Factor scores or KiSS-18 scores.

Therefore, participants were divided into three groups based on their LT Factor scores: the Improved group, the Unchanged group, and the Decreased group. LT and KiSS-18 scores were then analyzed for each group. Given the study’s objective of developing a physical education program focused on LT, the LT score was used for group classification.

(2) The LT Factor Score and KiSS-18 Score of Each Group

1) LT Factor score of each group <Does the dual-learning process improve LT scores in students’ evaluations?>

The analysis revealed a significant increase in the LT Factor score for the Improved group, no significant difference for the Unchanged group, and a significant decrease for the Decreased group. To interpret these results, we examined the mean (hereafter, M) and median (hereafter, Mdn) pre-scores for each group.

The mean and median pre-scores for LT Factor scores were as follows: Improved group (M=3.34, Mdn=3.33), Unchanged group (M=4.49, Mdn=5.00), and Decreased group (M=4.14, Mdn=4.33). In other words, students with low pre-scores belonged to the Improved group, those with high pre-scores to the Unchanged group, and those with mid-level pre-scores to the Decreased group.

These differences in pre-scores suggest that the LT score does not increase linearly, indicating a possible process of gradual acquisition. Therefore, this was considered as illustrated in Figure 2.

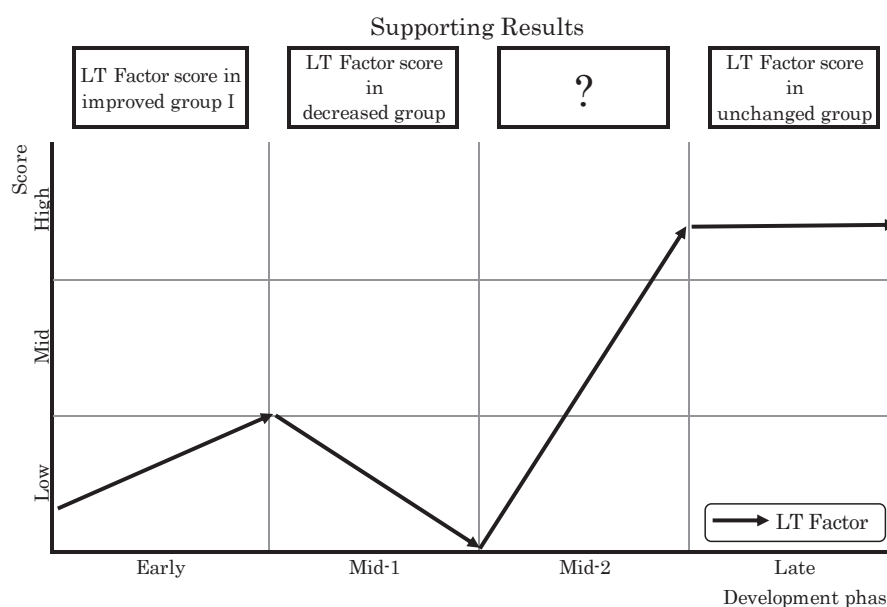


Figure 2. The LT Learning Curve (Draft) for Students Examined in Four Categories

Source: Author

However, no supporting results for Mid-2 were found. Consequently, further analysis was conducted (defining the Early-stage LT Factor score in the Improved group as “LT Factor score in Improved group I,” and the Mid-2 stage as “LT Factor score in the Improved group II.”) As shown in Table 1, the final value of the LT Factor score in the Decreased group was lower than the initial value of LT Factor scores in the Improved group I. In addition, the final value of the LT Factor scores in the Improved group II was less than or equal to 4.14 times the mean of the LT Factor scores in the Unchanged group. Consequently, the relevant participants for the LT Factor score in the Improved group II had initial value below 3.34 and final value above 4.14, with a significant improvement among these students ($N=14$, $\text{Pre}[M]=3.02$, $\text{Pre}[\text{Mid}]=3.00$, $\text{Post}[M]=4.88$, $\text{Post}[\text{Mid}]=5.00$, $Z=-3.32$, $p<.001$).

Excluding these 14 students, the Improved group I data remained significant ($N=55$, $\text{Pre}[M]=3.34$, $\text{Pre}[\text{Mid}]=3.33$, $\text{Post}[M]=4.13$, $\text{Post}[\text{Mid}]=4.33$, $Z=-6.60$, $p<.001$). Based on these results, a revised process model is illustrated in Figure 3. This analysis suggests that the lack of improvement in LT Factor scores for all participants may be due to a non-linear learning phase in LT scores, with potential declines at certain stages, such as Mid-1.

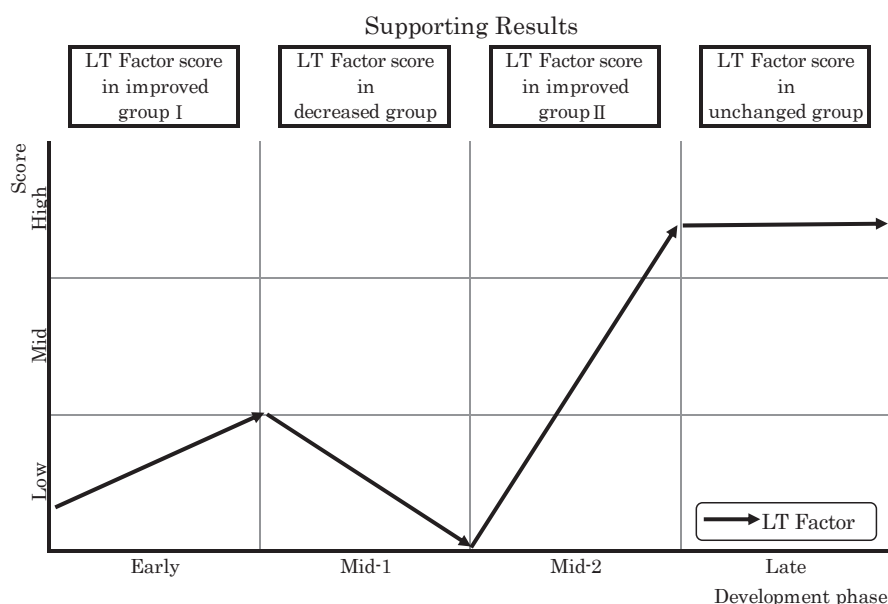


Figure 3. The LT Learning Curve for Students Examined in Four Categories

Source: Author

Referring to Figure 3, the decrease in the LT score observed in Mid-1 can be explained based on the conceptual framework of LT as “deepening understanding and awareness of mutual dependence, promoting values of pluralism, mutual understanding, and peace in collaborative projects, and learning conflict management skills” (Delors et al. 1996). LT can thus be viewed as a process of personal transformation involving the acceptance of diverse perspectives. Adolescents, especially high school students, are at a critical formative stage for developing a positive self-concept (Van der Crujisen et al. 2023), suggesting this period is conducive to LT instruction. However, self-transformation is also known to be challenging (Polivy and Herman 2002), with potential conflicts arising from anticipating both the benefits and drawbacks of change. Chishima (2015) examined this conflict among high school students, reporting that students often face “avoidance-avoidance conflicts” where they anticipate losses from both change and the status quo. Consequently, students experiencing score

declines in the LT Factor score, representing a stage prior to substantial score increases, may be significantly impacted by conflicts associated with self-transformation. This non-linear learning phase supported the assertion that “though sometimes linear and quantitative (increased functioning and ability), child development is often non-linear and qualitative” (Kim and Sankey 2010). Based on the above considerations, it was concluded that only limited improvement was observed in verifying the effects of PLT-PE due to the presence of a non-linear learning phase.

2) The relationship between LT Factor and KiSS-18 scores of each group <Does the dual-learning process improve “other competencies” scores in students’ evaluations?>

To address the second research question—whether the dual-learning process improves “other competencies” scores in student evaluations—KiSS-18 scores were analyzed across groups. Analysis showed a significant increase in the KiSS-18 score for the Improved group, with no significant differences observed for the Unchanged group or the Decreased group.

To interpret these results, we examined the M and Mdn pre-scores for each group. The pre-scores of KiSS-18 scores for each group were as follows: Improved group (M=59.06, Mdn=59.00), Unchanged group (M=68.42, Mdn=68.00), and Decreased group (M=60.57, Mdn=60.00). In other words, students with low pre-scores belonged to the Improved group, those with high pre-scores to the Unchanged group, and those with mid-level pre-scores to the Decreased group. The variation in pre-scores across the three groups suggests that the acquisition of KiSS-18 scores is not linear and is related to the LT score, as shown in Figure 4. Nonetheless, no supporting results were found for Mid-2 in this analysis. Consequently, further analysis was performed, defining the Early-stage KiSS-18 score in the Improved group as Improved group I and the Mid-2 stage as Improved group II.

Consequently, the relevant participants for LT Factor, classified as the 14 students in Mid-2, showed a significant improvement among these students (N=14, Pre[M]=60.21, Pre[Mid]=60.00, Post[M]=69.79, Post[Mid]=72.50, $Z=-2.73$, $p<.01$). Excluding these 14 students, the Improved group I data remained significant (N=55, Pre[M]=58.76, Pre[Mid]=59.00, Post[M]=60.15, Post[Mid]=60.00, $Z=-1.35$, n.s.). Based on these results, a revised process model is illustrated in Figure 4. Therefore, KiSS-18 scores classified the 55 students in the Early stage as the Unchanged group, and a revised process model is illustrated in Figure 5.

Furthermore, from Table 5, it was inferred that up to the Mid-level, other competencies developed earlier than the LT score. However, further investigation is needed regarding the progression from the Mid-level to the High-level. Based on the above considerations, it was concluded that only limited improvement was observed in verifying the effects of PLT-PE due to the presence of a non-linear learning phase.

The changes in LT Factor and KiSS-18 scores across groups suggest that the process of acquiring “LT and other competencies” likely proceeds through four stages, as illustrated in Figure 5.

Early Stage: LT is Low-level and gradually increases to Mid-levels. On the other hand, other competencies are Mid-level and maintained. Mid-1 Stage: LT is Mid-level and gradually decreases to Low-level. On the other hand, other competencies are Mid-level and maintained. Mid-2 Stage: LT is Low-level, and other competencies are Mid-level, with both scores increasing to High-level as they progress. Late Stage: LT and other competencies are both High-level and stable, showing no further significant changes.

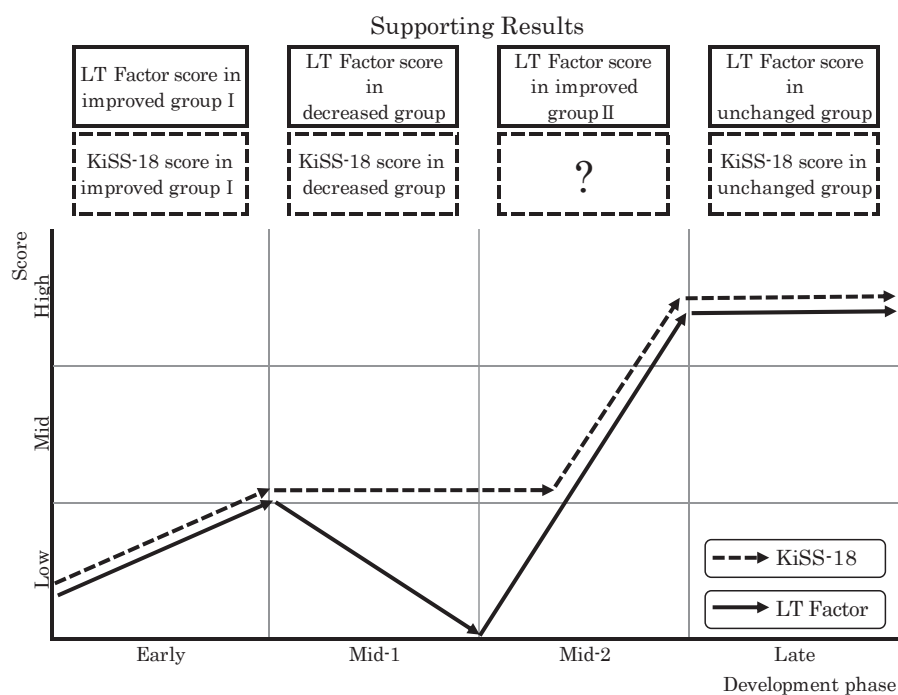


Figure 4. The LT Learning Curve and KiSS-18 (Other Competencies) Learning Curve (Draft) for Students Examined in Four Categories
Source: Author

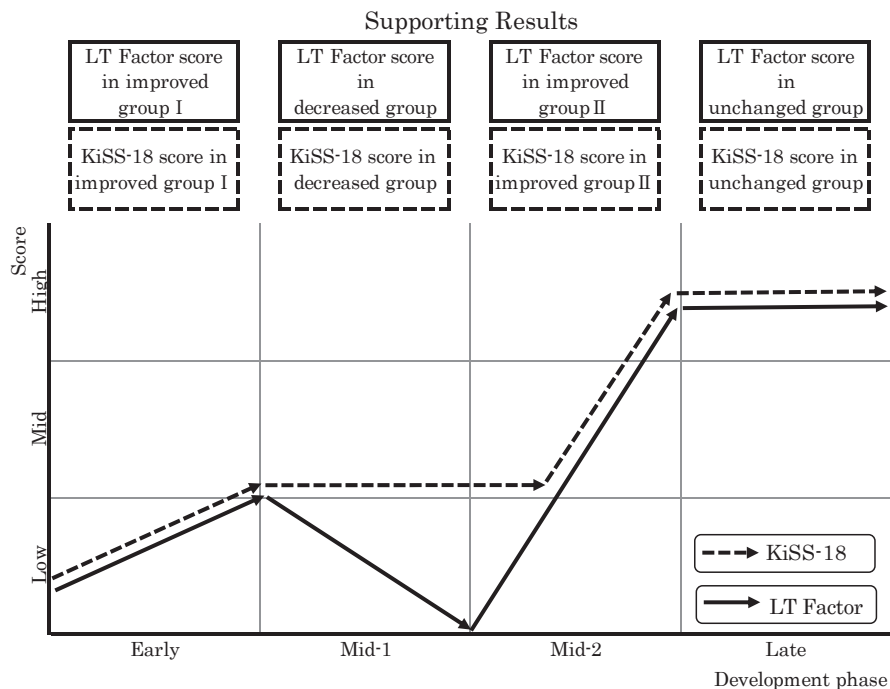


Figure 5. The LT Learning Curve and KiSS-18 (Other Competencies) Learning Curve (Draft) for Students Examined in Four Categories
Source: Author

6. Conclusion

The purpose of this study is to develop a physical education program by applying a dual learning process based on UNESCO’s PLT-PE and then to confirm its effects through student evaluation. The subjects were first-year high school students, and the program was implemented over seven hours in the unit focused on “Physical Fitness.” The items investigated were the LT Factor and the KiSS-18 score. The answers to the two research questions set in this study are summarized as follows:

Regarding the question, “Does the dual-learning process improve LT Factor scores in students’ evaluations?”, no significant improvement was observed across all participants. However, in the Improved group, LT Factor scores showed a statistically significant increase. In addition, the findings suggest the presence of a non-linear learning phase in LT acquisition. Therefore, although limited, a certain degree of effectiveness was observed.

Regarding the question, “Does the dual-learning process improve students’ scores in ‘Other Competencies’ (as measured by the KiSS-18)?”, no significant change was observed in the entire sample. Nevertheless, a significant increase in KiSS-18 scores was observed in the Improved group, where LT Factor scores also improved, indicating a possible effect of the program on “Other Competencies.”

However, these results are based on questionnaire responses, and whether actual behavioral changes occurred has not been examined. Additionally, it has not been completely clarified which learning process precedes the other. In other words, it remains unclear whether LT leads to improvements in “Other Competencies,” implying that LT is learned first, or whether “Other Competencies” are learned first as foundational conditions for LT. These issues need to be examined in future research.

Furthermore, several limitations related to the research design of this study should be acknowledged. 1) This study did not investigate the effectiveness of the overall Physical Fitness unit. 2) The developed program was applied only to a single unit (Physical Fitness), and thus its generalizability to other areas of physical education should be approached with caution. 3) Detailed data regarding the validity of the instructional implementation—such as teacher feedback and in-class interactions—were not collected. Future research should address these limitations in order to strengthen the applicability and impact of the program.

References

- André, A., P. Deneuve and B. Louvet. 2011. Cooperative Learning in Physical Education and Acceptance of Students with Learning Disabilities. *Journal of Applied Sport Psychology*, 23(4), 474–485.
- Bofill-Herrero, A., S. Baena-Morales, O. García-Taibo and A. Ferriz-Valero. 2022. Cooperative Learning and SDG 5: An Intervention for Physical Education in Secondary Schools. *Journal of Physical Education and Sport*, 22(7), 1570–1580.
- Bores-García, D., D. Hortigüela-Alcalá, J. Fernandez-Rio, G. González-Calvo and R. Barba-Martín. 2021. Research on Cooperative Learning in Physical Education: Systematic Review of the Last Five Years. *Research Quarterly for Exercise and Sport*, 92(1), 146–155.
- Casey, A. and V. A. Goodyear. 2015. Can Cooperative Learning Achieve the Four Learning Outcomes of Physical Education? A Review of Literature. *Quest*, 67(1), 56–72.
- Chishima, Y. 2015. The Benefits and Drawbacks of Anticipated Conflict in Self-Transformation During Adolescence: A Comparison by School Stage, *Hattatsu Shinrigaku Kenkyu (The Japanese Journal of Developmental Psychology)*, 26(1), 1–12. (in Japanese)

- Delors, J., I. Al-Mufti, I. Amagi, R. Carneiro, F. Chung, B. Geremek, W. Gorham, A. Kornhauser, M. Manley, Q. M. Padrón, M. A. Savane, K. Singh, R. Stavenhagen, W. S. Myong and N. Zhou. 1996. *Learning: The Treasure Within; Report to UNESCO of the International Commission on Education for the Twenty-first Century*. <<https://unesdoc.unesco.org/ark:/48223/pf0000102734>> (accessed February 1, 2024)
- Deardorff, D. 2023. *Learning to Live Together as Key to Our Future*. <<https://www.unesco.org/en/articles/learning-live-together-key-our-future>> (accessed February 1, 2024)
- De Luna, W., M. H. Sur and D. R. Shapiro. 2023. Using Paralympic School Day and Sport Education Model to Increase Awareness and Inclusion of Students with Disabilities in Physical Education. *Journal of Physical Education, Recreation & Dance*, 94(5), 5–15.
- Donna, G. and W. Jane. 2000. Inclusive Physical Education from the Perspective of Students with Physical Disabilities. *Adapted Physical Activity Quarterly: APAQ*, 17(2), 144–160.
- Draxler, A. 2010. The Delors Commission and Report. *NORRAG NEWS*, 43, 32–35.
- Dyson, B. 2001. Cooperative Learning in an Elementary Physical Education Program. *Journal of Teaching in Physical Education*, 20(3), 264–281.
- . 2002. The Implementation of Cooperative Learning in an Elementary Physical Education Program. *Journal of Teaching in Physical Education*, 22(1), 69–85.
- Fujii, K., S. Otomo, J. Nishida, N. Fukada, T. Yoshii and M. Kobayashi. 2022. Chugakko Dai 3 Gakunen oyobi Kotogakko Nyugaku Nenji wo Taisho toshita Taiiku Jugyo Hyoka Shakudo no Kaihatsu ni kansuru Kisoteki Kenkyu: Ikusei wo Mezasu 3 tsu no Shishitsu, Noryoku no Kanten kara (Fundamental study on developing a Japanese physical education scale for the 3rd Grade of Junior High School and 1st Grade of High School: From the viewpoint of 3 qualities and abilities that students are expected to develop). The 27th Academic Conference of the Japan Society for the Pedagogy of Physical Education Oral Presentation Materials. (in Japanese)
- Fujii, K., S. Otomo, J. Nishida, N. Fukada and T. Yoshii. 2024. 3 tsu no Shishitsu, Noryoku ni kansuru Taiiku Jugyo Hyoka Shakudo Sakusei no Kokoromi: Chugakko Dai 3 Gakunen oyobi Kotogakko Nyugaku Nenji wo Taisho to shite (Developing Three Japanese Physical Education Scales About Competency with Junior High School Students of Grade 3 and High School Students of Grade 1 in Japan). *Biwako Seikei Sport College Minutes of the Study*, 21, 19–33. (in Japanese)
- Grenier, M. A. 2011. Coteaching in Physical Education: A Strategy for Inclusive Practice. *Adapted Physical Activity Quarterly: APAQ*, 28(2), 95–112.
- Hagiwara, T., S. Kihara and H. Chosokabe. 2023. A Study of Teachers' Knowledge for Inclusive Physical Education Classes at Elementary School: A Case Study of Interviews Based on the Replay Stimulation Method Using Class Videos. *International Journal of Sport and Health Science*, 21, 74–95.
- Hellison, D. 2011. *Teaching Responsibility through Physical Activity*, third edition. Champaign: Human Kinetics.
- Iglesias, D., J. Fernandez-Rio and P. Rodríguez-González. 2023. Cooperative Learning in Physical Education: A Research Overview. *Apunts Educación Física y Deportes*, 151, 88–93.
- Joan, M. S. V., L. R. Terry and S. Claudine. 2003. Assessing Student Intention to Participate in Inclusive Physical Education. *Adapted Physical Activity Quarterly*, 20(1), 26–45.
- Johnson, D. W., R. T. Johnson and E. J. Holubec. 2010. *Circles of Learning: Cooperation in the Classroom*. Translated by Ishida Hirohisa and Umehara Miyoko. Tokyo: Kanekoshobo. (Translated from the original *Circles of Learning: Cooperation in the Classroom*, 5th edition. Edina, MN: Interaction Book Company, 2002.) (in Japanese)
- Kikuchi, A. 2004. KiSS-18 Kenkyu Noto (Notes on the Researches Using KiSS-18). *Bulletin of the Faculty of Social Welfare, Iwate Prefectural University*, 6 (2), 41–51. (in Japanese)
- Kim, M. and D. Sankey. 2010. The Dynamics of Emergent Self-Organisation: Reconceptualising Child Development in Teacher Education. *Australian Journal of Teacher Education*, 35(4), 79–98.
- Kim, M., and Park, S. 2024. Better Together: Promoting Cooperative Learning in Physical Education. *A Journal for Physical and Sport Educators*, 37(2), 38–40.
- Klavina, A. 2008. Using Peer-Mediated Instructions for Students with Severe and Multiple Disabilities in Inclusive Physical Education: A Multiple Case Study. *European Journal of Adapted Physical Activity*, 1(2), 7–19.
- Klavina, A. and E. M. Block. 2008. The Effect of Peer Tutoring on Interaction Behaviors in Inclusive Physical Education. *Adapted Physical Activity Quarterly: APAQ*, 25(2), 132–158.

- Li, C. and S. Chen. 2011. Implementation of Curriculum Planning on Inclusive Physical Education in Primary Schools in Hong Kong. *Asian Journal of Physical Education and Recreation*, 17(2), 57–65.
- Li, C. and L. K. Sam. 2011. Current Situation and Prospect of Inclusive Physical Education in Mainland China. *Asian Journal of Physical Education and Recreation*, 17(1), 31–36.
- Li, C., J. A. Haegele, C. McKay and L. Wang. 2022. Including Students with Physical Disabilities in Physical Education in Singapore: Perspectives of Peers Without Disabilities. *European Physical Education Review*, 28(1), 137–150.
- Lieberman, J. L., M. J. Dunn, H. van der Mars and J. McCubbin. 2000. Peer Tutors’ Effects on Activity Levels of Deaf Students in Inclusive Elementary Physical Education. *Adapted Physical Activity Quarterly*, 17(1), 20–39.
- Malinowski, P. R., K. A. Richards and W. J. Wilson. 2024. Including Students with Disabilities in the Sport Education Model: A Meaningful Physical Education Critique. *PALAESTRA*, 38(3), 13–18.
- Ministry of Education, Culture, Sports, Science and Technology (MEXT). 2010. Chuko Ikkan Kyoikuko ni okeru Tokushoku aru Kyoiku no Tenkai ya Kyoiku Katei no Tokurei no Katsuyo Jokyo ni tsuite. (On the Implementation of Distinctive Educational Programs and the Use of Curriculum Special Provisions in Integrated Junior and Senior High Schools) <https://www.mext.go.jp/b_menu/shingi/chukyo/chukyo3/045/siryo/_icsFiles/afiedfile/2011/02/03/1301433_01.pdf> (accessed February 1, 2024) (in Japanese)
- . 2017a. Shogakko Gakushu Shido Yoryo (Course of Study for Elementary Schools). <https://www.mext.go.jp/component/a_menu/education/micro_detail/_icsFiles/afiedfile/2018/09/05/1384661_4_3_2.pdf> (accessed February 1, 2024) (in Japanese)
- . 2017b. Chugakko Gakushu Shido Yoryo (Course of Study for Junior High Schools). <https://www.mext.go.jp/component/a_menu/education/micro_detail/_icsFiles/afiedfile/2018/05/07/1384661_5_4.pdf> (accessed February 1, 2024) (in Japanese)
- . 2018. Kotogakko Gakushu Shido Yoryo (Course of Study for High Schools). <https://www.mext.go.jp/content/20230120-mxt_kyoiku02-100002604_03.pdf> (accessed February 1, 2024) (in Japanese)
- Morley, D., R. Bailey, J. Tan and B. Cooke. 2005. Inclusive Physical Education: Teachers’ Views of Including Pupils with Special Educational Needs and/or Disabilities in Physical Education. *European Physical Education Review*, 11(1), 84–107.
- Nanayakkara, S. 2021. Teaching Inclusive Physical Education for Students with Disabilities: Reinvigorating In-Service Teacher Education in Sri Lanka. *Sport, Education and Society*, 27(2), 210–223.
- Navarro-Talón, M. C., M. I. Mármol-López, A. Baena-Extremera, B. J. Sánchez-Alcaraz, D. Amado-Alonso and S. Baena-Morales. 2024. Effects of Teaching Personal and Social Responsibility Model: Systematic Review and Meta-Analysis. *Cultura, Ciencia y Deporte*, 19(61), 143–157.
- Nemček, D. and J. Wittmannová. 2021. Gender Differences in Attitudes of Students Attending Non-Inclusive School Towards Inclusive Physical Education. *Acta Facultatis Educationis Physicae Universitatis Comenianae*, 61(2), 156–171.
- Okade, M. 2017. Naze “Manabi ni Mukau Chikara, Ningensei to” no Shido Naiyo ha Taiiku nomini Shimesaretanoka (Why was the “Cultivate the Motivation to Learn and Humanity” instructional content shown only for physical education?). In Editorial Department of TAISHUKAN Publishing Co., Ltd (eds.), *Taiikuka Kyoiku (Pedagogy of Physical Education)*. Tokyo: TAISHUKAN Publishing Co., Ltd, 39–41. (in Japanese)
- Organisation for Economic Co-operation and Development (OECD). 2018. *The Future of Education and Skills: Education 2030 - The Future We Want*. <https://www.oecd.org/content/dam/oecd/en/publications/reports/2018/06/the-future-of-education-and-skills_5424dd26/54ac7020-en.pdf?utm_source=chatgpt.com> (accessed July 20, 2025)
- . 2019. Making physical education dynamic and inclusive for 2030. OECD Future of Education and Skills 2030. <https://www.oecd.org/content/dam/oecd/en/publications/reports/2019/10/making-physical-education-dynamic-and-inclusive-for-2030_baa1c12c/7abe6b02-en.pdf> (accessed July 20, 2025)
- Otomo, S. 2017. “Manabi ni Mukau Chikara, Ningensei to no Kanyo” to Taiiku no Shido (“Cultivate the Motivation to Learn and Humanity” and Physical Education Instruction). In Editorial Department of TAISHUKAN Publishing Co., Ltd (eds.), *Taiikuka Kyoiku (Pedagogy of Physical Education)*. Tokyo: TAISHUKAN Publishing Co., Ltd, 42–45. (in Japanese)

- Park, S. S., Y. H. Koh and M. Block. 2014. Contributing Factors for Successful Inclusive Physical Education. *PALAESTRA*, 28(1).
- Polivy, J. and C. P. Herman. 2002. If at First, You Don't Succeed: False Hopes of Self-change. *American Psychologist*, 57(9), 677–689.
- Pinkerton, B. and T. Martinek. 2023. Teaching Personal and Social Responsibility Practitioners' Perceptions of the Application of Culturally Relevant Pedagogies. *Sport, Education and Society*, 28(5), 553–564.
- Průžek, M., I. Cihová, D. Novak, X. Wang, J. Vašíčková, L. Tománek and B. Antal. 2020. Inclusion in Physical Education on the Basis of Opinions of High School Female Students from Slovakia, Czech Republic and Croatia. *Journal of Physical Education and Sport*, 20(3), 1538–1542.
- Sánchez-Miguel, P. A., J. L. Álvarez-Sánchez, D. Hortigüela-Alcalá, A. Pérez-Pueyo and M. A. Tapia-Serrano. 2025. The Effect of the Teaching Personal and Social Responsibility Model on Personal and Social Responsibility in Physical Education: A Systematic Review and Meta-Analysis. *Quest*, 77(2), 237–266.
- Scatolini, S. S. A., J. Van Maele and M. Bartholomé. 2010. Developing a Curriculum for “Learning to Live Together”: Building Peace in the Minds of People. *European Perspectives on Internationalization* special issue, (1), 133–158.
- Schleien, S., L. Heyne and S. Berken. 1988. Physical Education to Teach Appropriate Play Skills to Learners with Autism: A Pilot Study. *Adapted Physical Activity Quarterly*, 5, 182–192.
- Seymour, H., G. Reid and A. G. Bloom. 2009. Friendship in Inclusive Physical Education. *Adapted Physical Activity Quarterly*, 26(3), 201–219.
- Shen, Y., T. Martinek and B. P. Dyson. 2022. Navigating the Processes and Products of the Teaching Personal and Social Responsibility Model: A Systematic Literature Review. *Quest*, 74(1), 91–107.
- Siedentop, D. 2002. Sport Education: A Retrospective. *Journal of Teaching in Physical Education*, 21(4), 409–418.
- Sinclair, M., L. Davies, A. Obura and F. Tibbitts. 2008. *Learning to Live Together Design, Monitoring and Evaluation of Education for Life Skills, Citizenship, Peace and Human Rights*. <https://www.edu-links.org/sites/default/files/media/file/doc_1_Learning_to_Live_Together.pdf> (accessed May 1, 2024)
- Tubić, T. and V. Djordjic. 2012. Inclusive Physical Education in Vojvodina: The Current Situation and Future Prospects. *Facta Universitatis, Series: Physical Education and Sport*, 10(4), 393–403.
- UNESCO Office Bangkok and Regional Bureau for Education in Asia and the Pacific. 2014. *Learning to Live Together: Education Policies and Realities in the Asia-Pacific*. <<https://unesdoc.unesco.org/ark:/48223/pf0000227208>> (accessed February 1, 2024)
- Van der Crujisen, R., N. E. Blankenstein, J. P. Spaans, S. Peters and E. A. Crone. 2023. Longitudinal Self-Concept Development in Adolescence. *Social Cognitive and Affective Neuroscience*, 18(1), 1–44.
- Wang, B. and S. Chen. 2021. Sport Education for Social Competence in K-12 Physical Education. *Quest*, 73(4), 391–409.
- Wang, L., J. Qi and L. Wang. 2015. Beliefs of Chinese Physical Educators on Teaching Students with Disabilities in General Physical Education Classes. *Adapted Physical Activity Quarterly*, 32(2), 137–155.
- Wiskochil, B., L. J. Lieberman, T. Huston-Wilson and S. Petersen. 2007. The Effects of Trained Peer Tutors on the Physical Education of Children who are Visually Impaired. *Journal of Visual Impairment & Blindness*, 101(6), 339–350.
- Yarimkaya, E. and T. L. Rizzo. 2020. Beliefs and Attitudes of Turkish Physical Educators toward Teaching Students with Disabilities in Inclusive Physical Education Classes. *PALAESTRA*, 34(4), 27–36.