



Strengthening teacher self-efficacy through SPS collaborative supervision model as continuing professional development for Physical Education in vocational schools

Fortalecimiento de la autoeficacia docente mediante el modelo de supervisión colaborativa SPS como desarrollo profesional continuo en Educación Física en escuelas vocacionales

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Abstract

Introduction: Teacher self-efficacy is crucial for improving Physical Education, yet supervision is often administrative rather than developmental.

Objective: This study developed and validated the SPS (Support-Participant-Skill) collaborative supervision model as a continuing professional development framework for strengthening teacher self-efficacy in Physical Education.

Methodology: A Research and Development design with an embedded one-group pretest-posttest evaluation involved 70 teachers from 20 vocational schools in 10 cities across 5 Indonesian provinces. Data were collected using expert validation sheets, feasibility and perceived effectiveness questionnaires, teacher self-efficacy scales, observation sheets, and reflection forms.

Results: SPS showed high validity (96.9%), feasibility (89.4%), perceived effectiveness (89.4%), and a significant increase in teacher self-efficacy from 3.39 to 4.08 ($p < .001$).

Discussion: SPS repositioned supervision as supportive, participatory, and skill-oriented professional learning.

Conclusion: SPS provides a practical school-based CPD model for strengthening Physical Education teacher self-efficacy.

Keywords

Teacher self-efficacy; collaborative supervision; continuing professional development; Physical Education; vocational schools.

Resumen

Introducción: La autoeficacia docente es crucial para mejorar la Educación Física; sin embargo, la supervisión suele ser administrativa más que formativa.

Objetivo: Este estudio desarrolló y validó el modelo de supervisión colaborativa SPS (Apoyo-Participante-Habilidad) como un marco de desarrollo profesional continuo para fortalecer la autoeficacia docente en Educación Física.

Metodología: Se aplicó un diseño de Investigación y Desarrollo con una evaluación pretest-posttest de un solo grupo, en la que participaron 70 docentes de 20 escuelas vocacionales ubicadas en 10 ciudades de 5 provincias de Indonesia. Los datos se recopilaron mediante hojas de validación de expertos, cuestionarios de viabilidad y efectividad percibida, escalas de autoeficacia docente, hojas de observación y formularios de reflexión.

Resultados: El modelo SPS mostró alta validez (96,9%), viabilidad (89,4%), efectividad percibida (89,4%) y un aumento significativo de la autoeficacia docente de 3,39 a 4,08 ($p < .001$).

Discusión: SPS reposicionó la supervisión como un aprendizaje profesional basado en el apoyo, la participación y el fortalecimiento de habilidades.

Conclusión: SPS ofrece un modelo práctico de desarrollo profesional continuo basado en la escuela para fortalecer la autoeficacia docente en Educación Física.

Palabras clave

Educación alternativa; autoeficacia docente; supervisión colaborativa; desarrollo profesional continuo; Educación Física; escuelas vocacionales.

Introduction

Research on teacher professional development has long emphasized the importance of continuous support in improving instructional quality and teacher performance. In Physical Education, this issue is particularly relevant because teachers are required not only to deliver subject content, but also to organize movement-based learning, manage active classroom situations, ensure student safety, provide appropriate feedback, and assess students' cognitive, affective, and psychomotor development (Herrera et al., 2024; Poblete-Valderrama et al., 2024). Recent studies also indicate that Physical Education teachers need sustained professional learning to respond to pedagogical, technological, and contextual changes in schools (Ahraz, 2025; Latino et al., 2024; I. Setiawan, 2024). However, recent literature also suggests that professional development in Physical Education remains uneven in its capacity to transform teachers' daily instructional practices when it is delivered as short-term training, isolated workshops, or externally driven programs. This indicates a need to move beyond professional development as an event and reposition it as a continuous, school-based, reflective, and practice-connected process (Ahraz, 2025; M. N. A. Setiawan et al., 2024; Ventista & Brown, 2023). Therefore, improving Physical Education requires attention not only to curriculum and facilities, but also to continuing professional development processes that strengthen teachers' confidence, competence, and reflective practice.

Teacher self-efficacy is an important psychological factor that shapes how teachers plan instruction, manage classroom challenges, engage students, and persist in improving their teaching practice. Teachers with stronger self-efficacy tend to show greater persistence, flexibility, openness to instructional innovation, and resilience when facing instructional challenges (Kusmiyati et al., 2024; Magill et al., 2023, 2024). In Physical Education, self-efficacy is especially important because teachers often deal with heterogeneous student abilities, limited facilities, safety concerns, and diverse levels of student motivation toward physical activity (Ma et al., 2025; Mohammed et al., 2025; Woodcock & Hardy, 2025). Nevertheless, self-efficacy should not be understood merely as an individual psychological attribute. It is also shaped by the professional environment in which teachers receive feedback, experience support, reflect on teaching problems, and develop mastery through practice. In this sense, teacher self-efficacy is closely connected to the quality of professional learning structures available in schools (Kusmiyati et al., 2024; Ma et al., 2025; Magill et al., 2024). When teachers feel confident in planning, implementing, assessing, and reflecting on Physical Education learning, they are more likely to create safe, inclusive, enjoyable, and meaningful learning experiences.

However, teacher professional development in Physical Education cannot rely only on short-term workshops or formal training. It requires school-based support that is continuous, contextual, and connected to teachers' everyday instructional realities. Recent evidence suggests that sustained professional learning, collaborative CPD, and coaching are more likely to support meaningful changes in teachers' practice than isolated training activities (Ventista & Brown, 2023). In Physical Education, reflective practice is also important because it helps teachers examine instructional experiences and improve teaching decisions in dynamic learning situations (T. Zhou et al., 2025). Academic supervision has the potential to serve this function when it is designed as a developmental process rather than merely an administrative requirement. In many school contexts, supervision is still commonly associated with document checking, formal classroom observation, and compliance with institutional standards. Such practices often provide limited opportunities for teachers to receive constructive feedback, engage in reflective dialogue, or develop the practical confidence needed to improve their teaching (Kaloudis et al., 2025; Martín-Rodríguez & Madrigal-Cerezo, 2025; Spittle et al., 2023). This creates a conceptual and practical tension: supervision is expected to improve teaching quality, but in practice it often remains evaluative, hierarchical, and weakly connected to teachers' professional agency. For Physical Education teachers, this tension is more visible because effective teaching requires immediate pedagogical decisions, safety management, active student engagement, and context-sensitive feedback (Kaloudis et al., 2025; Poblete-Valderrama et al., 2024; Q. Zhou & Zhang, 2025). Accordingly, supervision needs to be repositioned as a continuing professional development mechanism rather than a one-way evaluative activity.

This issue is also relevant in vocational school contexts. Vocational schools are expected to prepare students for work, further education, and active social participation. Within this setting, Physical Education contributes to students' health, physical literacy, teamwork, discipline, resilience, and socio-emotional



development. However, the application of continuing professional development to Physical Education in vocational schools requires attention to specific pedagogical challenges, including limited instructional time, diverse student characteristics, varying levels of physical competence, and the need to connect physical activity with broader educational goals. These challenges require teachers not only to master instructional techniques, but also to develop confidence in adapting learning activities, managing active classrooms, providing inclusive feedback, and linking Physical Education with students' personal and vocational development. Therefore, supervision in vocational school Physical Education should be designed as a developmental process that helps teachers translate professional learning into situated teaching decisions (Luo et al., 2025; Mohammed et al., 2025; Xue et al., 2026). These conditions indicate the need for supervision models that do not merely assess teacher performance, but also support teachers in strengthening self-efficacy and improving Physical Education-oriented teaching practice (Boke et al., 2025; Jarvis & Rainer, 2025; Luo et al., 2025; Xue et al., 2026).

Although collaborative and collegial supervision models have been widely discussed as alternatives to hierarchical supervision, several gaps remain. First, many continuing professional development studies in Physical Education focus on training, digital competence, or pedagogical innovation, but give less attention to supervision as a structured professional learning mechanism (Ahraz, 2025; Latino et al., 2024; I. Setiawan, 2024). Second, existing supervision models often remain general in orientation and do not sufficiently address the specific pedagogical demands of Physical Education. Third, limited research has developed and validated a supervision model that explicitly integrates structured support, active teacher participation, and skill-focused coaching to strengthen teacher self-efficacy (Kusmiyati et al., 2024; Ma et al., 2025; Nurhayati et al., 2025). More specifically, recent studies in Retos have discussed Physical Education teacher self-efficacy, online professional development, TPACK competence, and pedagogical practice; however, these studies have not yet positioned collaborative supervision itself as a validated CPD model that integrates emotional-instructional support, teacher participation, and practical skill development within one school-based supervision cycle (Kusmiyati et al., 2024; Nurhayati et al., 2025; Poblete-Valderrama et al., 2024). These gaps show the need for a supervision model that connects collaborative supervision, continuing professional development, and teacher self-efficacy within Physical Education-oriented practice.

This study aims to develop and validate the SPS collaborative supervision model as a continuing professional development framework for strengthening teacher self-efficacy in Physical Education. SPS refers to three integrated dimensions: Support, Participant, and Skill. The Support dimension emphasizes institutional, emotional, and instructional assistance for teachers. The Participant dimension highlights teachers' active involvement in planning, reflection, and decision-making during the supervision process. The Skill dimension focuses on strengthening practical teaching competencies through observation, feedback, and coaching. The novelty of this study lies in positioning SPS collaborative supervision as a school-based continuing professional development model that integrates structured support, active teacher participation, and skill-focused coaching to strengthen teacher self-efficacy in Physical Education-oriented practice. The novelty of this study lies in transforming supervision from a primarily evaluative or administrative process into a structured CPD model that combines three mechanisms: support as the condition for psychological and instructional safety, participation as the basis for teacher agency, and skill-focused coaching as the pathway for practical instructional improvement. Unlike professional development approaches that mainly emphasize training participation or competence acquisition, SPS places supervision itself as the medium through which teacher self-efficacy can be strengthened in situated Physical Education practice (Ahraz, 2025; Kaloudis et al., 2025; Ventista & Brown, 2023). Accordingly, this study contributes to continuing teacher education and Physical Education methodology by showing how collaborative supervision can be structured as a school-based professional learning process that supports teachers' pedagogical confidence, reflective practice, and instructional improvement (Kaloudis et al., 2025; Martín-Rodríguez & Madrigal-Cerezo, 2025; Nurhayati et al., 2025).



Method

Participants and Setting

The data for this study were collected from 70 teachers from 20 vocational schools located in 10 cities across 5 provinces in Indonesia. The participating schools were distributed across North Sumatra, DKI Jakarta, West Java, Central Java, and East Java. The cities included Medan, Binjai, East Jakarta, South Jakarta, Bandung, Bekasi, Semarang, Surakarta, Surabaya, and Malang. This geographical distribution was intended to provide broader contextual variation in examining the implementation of the SPS collaborative supervision model across different vocational school settings. The participants consisted of Physical Education teachers and teachers involved in Physical Education-oriented professional development activities. They were selected using purposive sampling based on four inclusion criteria: involvement in school-based teaching or supervision activities, relevance to Physical Education-oriented professional development, willingness to participate in the SPS supervision cycle, and ability to complete the research instruments. Purposive sampling was used because the study required participants who had direct experience with school-based teaching, supervision activities, and Physical Education-oriented professional development, so that they could provide contextually relevant responses regarding the feasibility, perceived effectiveness, and implementation of the SPS model. The names of the schools and individual participants were not reported to protect institutional and personal confidentiality.

Table 1. Distribution of Research Sites and Participants

Province	City	Number of schools	Number of teachers	Participant profile
North Sumatra	Medan	2	7	PE teachers and teachers involved in PE-oriented CPD
North Sumatra	Binjai	2	7	PE teachers and teachers involved in PE-oriented CPD
DKI Jakarta	East Jakarta	2	7	PE teachers and teachers involved in PE-oriented CPD
DKI Jakarta	South Jakarta	2	7	PE teachers and teachers involved in PE-oriented CPD
West Java	Bandung	2	7	PE teachers and teachers involved in PE-oriented CPD
West Java	Bekasi	2	7	PE teachers and teachers involved in PE-oriented CPD
Central Java	Semarang	2	7	PE teachers and teachers involved in PE-oriented CPD
Central Java	Surakarta	2	7	PE teachers and teachers involved in PE-oriented CPD
East Java	Surabaya	2	7	PE teachers and teachers involved in PE-oriented CPD
East Java	Malang	2	7	PE teachers and teachers involved in PE-oriented CPD
Total	10 cities	20 schools	70 teachers	

Research Design

This study used a developmental Research and Development (R&D) design with an embedded one-group pretest–posttest evaluation during the field trial phase. The R&D component was used to develop, validate, revise, and field-test the SPS collaborative supervision model, while the pretest–posttest component was used to examine changes in teacher self-efficacy after participation in the SPS supervision cycle. The one-group pretest–posttest component was used as an initial evaluation of change associated with SPS implementation, not as a controlled experimental test of causal effectiveness. Therefore, the results were interpreted as evidence of improvement after participation in the SPS cycle rather than as definitive causal proof.

The SPS model was designed around three dimensions: Support, Participant, and Skill. The Support dimension focused on institutional, emotional, and instructional assistance for teachers, including time allocation, learning resources, constructive feedback, and a supportive supervision climate. The Participant dimension emphasized teachers' active involvement in co-planning, reflection, problem identification, and instructional decision-making. The Skill dimension focused on strengthening practical teaching competencies through classroom observation, dialogic feedback, coaching, follow-up improvement, and



reflection on teaching practice. In this study, SPS was operationalized through a supervision cycle consisting of co-planning, classroom observation, dialogic feedback, reflection, and instructional refinement. This operationalization was intended to ensure that the three dimensions of SPS were translated into observable supervision activities rather than treated only as conceptual dimensions.

Instrument

The instruments used in this study consisted of expert validation sheets, teacher feasibility questionnaires, teacher perceived effectiveness questionnaires, a teacher self-efficacy scale, classroom observation sheets, and teacher reflection forms.

The expert validation sheets were used to assess the content, design, language, and procedural clarity of the SPS collaborative supervision model. The validation indicators covered conceptual relevance, alignment with Physical Education-oriented continuing professional development, clarity of supervision procedures, usability of the instruments, and coherence among the Support, Participant, and Skill dimensions. The experts were selected based on four criteria: expertise in Physical Education pedagogy, teacher professional development, educational supervision, or educational measurement; experience in developing or evaluating instructional models, supervision instruments, or teacher development programs; academic or professional engagement with school-based teaching improvement; and willingness to review the SPS model and its supporting instruments independently. Expert judgment was used to examine whether the model and instruments were conceptually relevant, clear, coherent, and suitable for Physical Education-oriented continuing professional development (Rozo-García et al., 2024).

The teacher feasibility questionnaire measured participants' perceptions of the clarity, practicality, relevance, and applicability of the SPS model. The teacher perceived effectiveness questionnaire measured teachers' perceptions of the contribution of SPS to lesson planning, instructional delivery, classroom management, feedback use, student engagement, and reflective teaching practice. The term perceived effectiveness was used to indicate that effectiveness was examined through teachers' responses, observation records, and reflection data after participation in the SPS supervision cycle, rather than through a controlled experimental comparison. Thus, perceived effectiveness in this study refers to teachers' perceived usefulness of the SPS model in supporting professional learning and instructional improvement, not to causal effectiveness established through an experimental design.

Teacher self-efficacy was measured using an adapted teacher self-efficacy scale based on the core dimensions of the Teachers' Sense of Efficacy Scale, namely student engagement, instructional strategies, and classroom management (Tschannen-Moran & Hoy, 2001). The scale consisted of 12 items, with four items for each dimension, rated on a five-point Likert scale ranging from 1 = strongly disagree to 5 = strongly agree. Higher scores indicated stronger teacher self-efficacy. The items were contextually adapted to Physical Education-oriented practice, including movement-based learning, active classroom management, safe participation, student motivation, instructional feedback, and reflective improvement. The adaptation process was conducted in five stages. First, the original construct domains were reviewed to ensure conceptual alignment with teacher self-efficacy in Physical Education. Second, item wording was adjusted to reflect the specific demands of Physical Education teaching, including movement-based learning, student safety, active participation, classroom organization, instructional feedback, and reflective improvement. Third, the adapted items were reviewed by experts to assess content relevance, clarity, contextual suitability, and alignment with the three dimensions of teacher self-efficacy. Fourth, the revised items were tested during the small-group trial to identify possible ambiguity in wording and interpretation. Fifth, final revisions were made before the field trial based on expert comments and teacher feedback. This process was intended to preserve the conceptual meaning of teacher self-efficacy while making the items contextually appropriate for Physical Education-oriented teaching practice.

The classroom observation sheet documented the implementation of the SPS dimensions in Physical Education-oriented teaching practice. The observed aspects included planning quality, active learning management, student engagement, instructional feedback, safe participation, and reflective improvement. The teacher reflection form captured participants' experiences, perceived benefits, implementation challenges, perceived changes in confidence, and suggestions for improving the SPS model. The observation sheet and teacher reflection form were used as complementary qualitative sources to contextualize the quantitative findings. Observation data helped document how the SPS cycle was enacted in

practice, while reflection forms helped capture teachers' subjective experiences of support, participation, feedback, and instructional improvement. These qualitative data were not used to test causal effectiveness, but to support interpretation, triangulation, and model refinement.

Table 2. Instruments and Measured Aspects

Instrument	Main purpose	Main aspects measured
Expert validation sheet	To assess model and instrument quality	Content relevance, design, language, procedure, PE-oriented suitability
Feasibility questionnaire	To assess model usability	Clarity, practicality, relevance, applicability
Perceived effectiveness questionnaire	To assess perceived contribution of SPS	Planning, instruction, management, feedback use, engagement, reflection
Teacher self-efficacy scale	To measure self-efficacy before and after SPS	Student engagement, instructional strategies, classroom management
Classroom observation sheet	To document SPS implementation	Planning quality, active learning, feedback, safe participation
Teacher reflection form	To capture participant experience	Benefits, challenges, confidence, suggestions

Procedure

The research procedure consisted of six stages: needs analysis, model design, product development, expert validation, small-group trial, and field trial followed by final revision. The first stage was the needs analysis. This stage identified existing supervision practices, teachers' professional development needs, and challenges in implementing Physical Education-oriented teaching in vocational school contexts. The needs analysis was conducted through document review, field diagnosis, and teacher input related to supervision, feedback, instructional support, and reflective practice. The second stage was model design. In this stage, the SPS framework was formulated by integrating the three dimensions of Support, Participant, and Skill into a collaborative supervision cycle. The cycle included co-planning, classroom observation, dialogic feedback, reflection, and instructional refinement. The third stage was product development. This stage produced the SPS supervision manual, observation sheets, feedback forms, teacher reflection forms, feasibility questionnaires, perceived effectiveness questionnaires, and teacher self-efficacy scale. The instruments were designed to support the implementation and evaluation of SPS as a continuing professional development model in Physical Education.

The fourth stage was expert validation. Experts reviewed the SPS model and its instruments in terms of content relevance, conceptual clarity, procedural coherence, language, design, and suitability for Physical Education-oriented continuing professional development. Feedback from expert validation was used to revise the model before implementation. Revisions after expert validation focused on improving the clarity of supervision procedures, refining the wording of questionnaire items, strengthening the alignment between SPS dimensions and implementation activities, and ensuring that the instruments were suitable for Physical Education-oriented school contexts. The fifth stage was the small-group trial. A limited group of participants experienced one SPS supervision cycle and provided feedback on the clarity, practicality, and initial feasibility of the model. The results of this stage were used to refine the supervision procedures and supporting instruments. The sixth stage was the field trial. The revised SPS model was implemented with 70 teachers from 20 vocational schools. Before the SPS supervision cycle, participants completed the teacher self-efficacy scale as a pretest. They then participated in the SPS cycle, including co-planning, classroom observation, dialogic feedback, reflection, and instructional refinement. After completing the cycle, participants completed the teacher self-efficacy scale as a posttest, along with the feasibility questionnaire, perceived effectiveness questionnaire, and teacher reflection form. Observation records were also collected to support the interpretation of implementation data. The field trial therefore generated both quantitative evidence of feasibility, perceived effectiveness, and self-efficacy change, and qualitative evidence regarding teachers' experiences during SPS implementation.

Data analysis

Quantitative data were analyzed using descriptive and inferential statistics. Descriptive statistics, including mean, standard deviation, minimum score, maximum score, frequency, and percentage, were used to describe expert validation, feasibility, perceived effectiveness, and teacher self-efficacy scores.



Content validity of the SPS model and supporting instruments was examined using expert judgment. Where applicable, Aiken's *V* was used to estimate the degree of expert agreement on item relevance, clarity, and suitability. Expert validation, feasibility, and perceived effectiveness scores were also converted into percentages using the following formula: Percentage = (Obtained score / Maximum score) × 100. Aiken's *V* was used because the validation process involved expert ratings of item relevance, clarity, coherence, and contextual suitability. Items and components with lower expert agreement were reviewed and revised before field implementation.

The percentage scores were interpreted using predetermined classification criteria. Scores between 86% and 100% were categorized as very feasible or very effective; scores between 75% and 85% as feasible or effective; scores between 65% and 74% as moderately feasible or moderately effective; scores between 55% and 64% as less feasible or less effective; and scores below 55% as not feasible or not effective.

For the teacher self-efficacy scale, scores were calculated by computing the mean score of each dimension: student engagement, instructional strategies, and classroom management. The total self-efficacy score was obtained by averaging all self-efficacy items. Instrument reliability was examined using Cronbach's alpha, McDonald's omega, and corrected item-total correlation. Alpha and omega were both reported to provide stronger reliability evidence, especially because teacher self-efficacy was treated as a multidimensional construct (Malkewitz et al., 2023; Trizano-Hermosilla et al., 2021). Corrected item-total correlation was used to examine whether each item contributed adequately to the overall scale or its respective dimension. Reporting both Cronbach's alpha and McDonald's omega was intended to reduce reliance on a single reliability coefficient and provide more robust internal consistency evidence.

Before inferential analysis, the normality of pretest and posttest self-efficacy scores was examined using the Shapiro-Wilk test. If the data were normally distributed, a paired samples *t*-test was used to examine differences between pretest and posttest self-efficacy scores. If the data were not normally distributed, the Wilcoxon signed-rank test was used as a non-parametric alternative. Effect size was calculated to determine the magnitude of change in teacher self-efficacy after participating in the SPS supervision cycle. For paired samples *t*-test results, Cohen's *d_z* was used, while for Wilcoxon signed-rank test results, rank-biserial correlation was used. Because the field trial used a one-group pretest-posttest design, inferential results were interpreted as evidence of statistically significant change over time, not as evidence of causal effectiveness.

Correlation analysis was also conducted to examine the relationship between teachers' perceived effectiveness of SPS and posttest self-efficacy scores. Pearson correlation was used when the data met parametric assumptions, while Spearman correlation was used when the assumptions were not met. This analysis was conducted to determine whether teachers who perceived SPS as more useful also reported higher self-efficacy after participating in the supervision cycle.

Qualitative data from classroom observation notes and teacher reflection forms were analyzed descriptively. The analysis focused on participants' experiences during the SPS cycle, perceived changes in confidence, implementation challenges, and suggestions for improving the model. The integration of quantitative and qualitative findings was used to strengthen interpretation, support triangulation, and refine the final SPS collaborative supervision model. The qualitative analysis followed three steps: reading observation notes and reflection forms repeatedly, identifying recurring patterns related to Support, Participant, and Skill dimensions, and summarizing themes that explained teachers' experiences during SPS implementation. The qualitative findings were then compared with feasibility, perceived effectiveness, and self-efficacy results to examine whether the quantitative and qualitative evidence converged, complemented each other, or showed possible inconsistencies. The integration of quantitative and qualitative findings was used to strengthen interpretation, support triangulation, and refine the final SPS collaborative supervision model.

Table 4. Statistical Analysis Plan

Research focus	Instrument/data source	Statistical analysis
Validity of SPS model	Expert validation sheet	Aiken's <i>V</i> and percentage
Feasibility of SPS model	Feasibility questionnaire	Mean, SD, percentage, category interpretation
Perceived effectiveness of SPS	Perceived effectiveness questionnaire	Mean, SD, percentage, category interpretation



Teacher self-efficacy before and after SPS	Teacher self-efficacy scale	Shapiro–Wilk; paired samples t-test or Wilcoxon
Magnitude of self-efficacy change	Pretest–posttest self-efficacy scores	Cohen’s dz or rank-biserial correlation
Instrument reliability	Self-efficacy item scores	Cronbach’s alpha, McDonald’s omega, corrected item-total correlation
Relationship between SPS perception and self-efficacy	Perceived effectiveness and posttest self-efficacy scores	Pearson or Spearman correlation
Implementation experience	Observation notes and reflection forms	Descriptive qualitative analysis

Ethical Considerations

The study followed ethical procedures for school-based research. The identities of schools and participants were protected. Although the study reports the general geographical distribution of the sample, the names of individual schools and participants are not disclosed. All findings were reported in aggregate form to prevent identification of specific institutions or individuals. Participants were informed about the purpose of the study, the procedures involved, the voluntary nature of their participation, and their right to withdraw at any stage without consequence. Informed consent was obtained before data collection. Participants were also informed that the data collected would be used only for research purposes and would not affect their formal performance evaluation at school. To minimize potential power imbalance in the supervision process, participation in the SPS supervision cycle was separated from formal teacher performance appraisal. Observation and reflection data were used only for research and model refinement, not for administrative evaluation. Feedback was framed as constructive professional support for instructional improvement. Supervisors and researchers were instructed to avoid using observation results as evaluative judgments of individual teacher performance. Instead, observation and feedback were positioned as developmental tools to support reflective practice and instructional improvement. The study posed minimal risk to participants and was designed to provide professional benefits through collaborative planning, dialogic feedback, reflection, and instructional support.

Limitations

This study has several limitations that should be considered when interpreting the findings. Although it involved 70 teachers from 20 vocational schools located in 10 cities across 5 provinces in Indonesia, the use of purposive sampling means that the findings should be interpreted as context-based evidence rather than as nationally representative results. In addition, the developmental Research and Development design with an embedded one-group pretest–posttest evaluation did not include a control or comparison group; therefore, causal interpretations regarding changes in teacher self-efficacy should be made cautiously. The pretest–posttest results indicate improvement after SPS participation, but they cannot rule out alternative explanations such as prior experience, school context, teacher motivation, or other professional development activities occurring during the same period. Teacher self-efficacy and perceived effectiveness were also measured partly through self-report instruments, which may be influenced by response bias or participants’ subjective perceptions, although observation records and reflection forms were used to support the interpretation of the findings. Furthermore, this study focused on teacher-level outcomes and did not directly examine student learning outcomes, physical literacy, motor skill development, or long-term participation in physical activity. The implementation of the SPS model may also have been influenced by contextual factors such as school leadership, supervision culture, facilities, teacher workload, and readiness for reflective practice. Future studies should use comparative or longitudinal designs, include repeated SPS supervision cycles, examine student-level outcomes, and investigate the sustainability of SPS implementation across broader and more diverse Physical Education contexts. Future research should also consider using stronger mixed-methods integration, such as joint displays, to show more explicitly how quantitative changes in teacher self-efficacy are supported by qualitative evidence from observation and reflection.

Results

Validation, Feasibility, and Perceived Effectiveness of the SPS Model

The SPS collaborative supervision model was evaluated through expert validation, small-group trial, and field trial. Expert validation showed that the content domain reached 100.0%, while the media and design domains each reached 95.4%. These results indicate that the SPS model had strong content relevance, procedural clarity, and design quality before field implementation. The small-group trial produced an overall feasibility score of 82.0%, indicating that the model was feasible and understandable for initial use. After revisions were made to the supervision instructions, reflection forms, and questionnaire wording, the field trial showed higher feasibility, with an overall score of 89.4%. The perceived effectiveness score also reached 89.4%, indicating that teachers perceived the SPS model as highly useful for supporting instructional planning, classroom management, feedback use, student engagement, and reflective teaching practice. The increase from the small-group trial to the field trial suggests that the revision process strengthened the clarity, practicality, and usability of the SPS model before wider implementation. This result is important because the purpose of the developmental phase was not only to validate the model conceptually, but also to ensure that the model could be implemented in real Physical Education-oriented school contexts.

Table 5. Consolidated Results of Model Validation, Feasibility, and Perceived Effectiveness

Evaluation phase	Aspect	Score (%)	Category
Expert validation	Content	100.0	Very valid
Expert validation	Media	95.4	Very valid
Expert validation	Design	95.4	Very valid
Small-group trial	Overall feasibility	82.0	Feasible
Field trial	Overall feasibility	89.4	Very feasible
Field trial	Overall perceived effectiveness	89.4	Very effective

Taken together, the validation, feasibility, and perceived effectiveness results indicate that the SPS model met three important developmental criteria: conceptual validity, practical usability, and perceived usefulness. The high expert validation scores support the conceptual and procedural quality of the model, while the increase in feasibility from the small-group trial to the field trial indicates that revisions improved its practical implementation. The perceived effectiveness score further suggests that teachers experienced SPS as relevant to their instructional planning, classroom management, feedback use, student engagement, and reflective teaching practice.

Reliability of the Instruments

Reliability analysis was conducted to examine the internal consistency of the instruments used in the field trial. The feasibility questionnaire, perceived effectiveness questionnaire, and teacher self-efficacy scale showed good to high internal consistency. The teacher self-efficacy scale also showed consistent reliability across pretest and posttest administration, indicating that the instrument was stable for measuring teachers' confidence in student engagement, instructional strategies, and classroom management. The use of both Cronbach's alpha and McDonald's omega provided complementary reliability evidence, especially because teacher self-efficacy was treated as a multidimensional construct. This was important because relying only on Cronbach's alpha may be insufficient when item relationships and dimensional structures are complex (Malkewitz et al., 2023; Trizano-Hermosilla et al., 2021).

Table 6. Reliability of Research Instruments

Instrument	Number of items	Cronbach's alpha	McDonald's omega	Corrected item-total correlation	Interpretation
Feasibility questionnaire	15	.88	.89	.42-.74	Good internal consistency
Perceived effectiveness questionnaire	18	.90	.91	.45-.77	High internal consistency
Self-efficacy scale – pretest	12	.87	.88	.41-.72	Good internal consistency
Self-efficacy scale – posttest	12	.89	.90	.44-.76	High internal consistency



The reliability coefficients were reported using both Cronbach's alpha and McDonald's omega to provide stronger evidence of internal consistency, especially because teacher self-efficacy was treated as a multidimensional construct. All corrected item-total correlations exceeded .30, indicating that the items contributed adequately to their respective instruments. These results suggest that the instruments had adequate internal consistency for use in the field trial. However, the reliability evidence should be interpreted as internal consistency evidence within this sample, not as evidence of full psychometric validation across broader teacher populations.

Perceived Effectiveness by SPS Dimension

The perceived effectiveness of the SPS model was also examined based on its three dimensions: Support, Participant, and Skill. The Participant dimension obtained the highest score, followed by Skill and Support. This pattern indicates that teachers responded most positively to the opportunity to participate actively in co-planning, reflection, problem identification, and instructional decision-making. This finding is directly aligned with the purpose of SPS, which was designed to reposition teachers from passive recipients of supervision to active participants in professional learning. The high score on the Participant dimension suggests that teacher involvement in planning, reflection, and decision-making was a central element in the perceived usefulness of the model.

Table 7. Perceived Effectiveness by SPS Dimension

SPS dimension	Score (%)	Category	Main interpretation
Support	87.6	Very high	Teachers perceived institutional, emotional, and instructional support as useful, although its implementation varied across school contexts
Participant	91.2	Very high	Teachers showed strong engagement in co-planning, reflection, and decision-making
Skill	89.4	Very high	Teachers perceived improvement in practical teaching skills through observation, feedback, and coaching
Overall	89.4	Very high	SPS was perceived as a strong CPD-oriented supervision model

The stronger score in the Participant dimension suggests that the collaborative character of SPS was central to its perceived usefulness. Rather than positioning teachers as passive objects of supervision, the model encouraged them to become active participants in identifying instructional problems and planning improvements. The pattern across the three dimensions also indicates that SPS was perceived as useful not because of one isolated component, but because Support, Participant, and Skill worked together as a supervision cycle. Support created a more constructive supervision climate, Participant strengthened teacher involvement, and Skill directed the supervision process toward practical instructional improvement.

Teacher Self-Efficacy Before and After SPS Implementation

Teacher self-efficacy was measured before and after participation in the SPS supervision cycle. The descriptive results showed an increase across all three dimensions: student engagement, instructional strategies, and classroom management. The total self-efficacy mean increased from 3.39 in the pretest to 4.08 in the posttest. This increase indicates a positive change in teachers' perceived confidence after participating in the SPS collaborative supervision cycle. The consistent increase across all dimensions suggests that SPS was associated not only with a general improvement in teacher confidence, but also with improvement in specific areas of teaching efficacy that are relevant to Physical Education practice, namely engaging students, selecting instructional strategies, and managing active learning situations.

Before conducting the paired samples t-test, normality was examined using the Shapiro-Wilk test. The pretest and posttest scores met the normality assumption, with p-values greater than .05. Therefore, paired samples t-tests were used to examine differences between pretest and posttest scores.

Table 8. Teacher Self-Efficacy Before and After SPS Implementation

Dimension	Pretest M ± SD	Posttest M ± SD	Mean difference	Shapiro-Wilk p	t(69)	p	Cohen's dz
Student engagement	3.36 ± 0.48	4.05 ± 0.43	0.69	.214	9.88	< .001	1.18
Instructional strategies	3.42 ± 0.46	4.12 ± 0.40	0.70	.286	10.42	< .001	1.25
Classroom management	3.39 ± 0.51	4.08 ± 0.44	0.69	.193	9.35	< .001	1.12



Total self-efficacy	3.39 ± 0.41	4.08 ± 0.36	0.69	.247	11.06	< .001	1.32
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The paired samples t-test showed that teacher self-efficacy increased significantly after participation in the SPS supervision cycle. Significant increases were found in student engagement, instructional strategies, classroom management, and total self-efficacy. The effect sizes were large, indicating that the increase was not only statistically significant but also practically meaningful. However, because the study used a one-group pretest–posttest design, these findings should be interpreted as evidence of improvement associated with SPS participation rather than as definitive causal proof. Thus, the statistical results support the developmental promise of the SPS model, but they should not be interpreted as conclusive evidence that SPS alone caused the observed improvement. Alternative explanations, such as teachers' prior professional experience, school context, motivation, or other professional learning activities during the same period, cannot be fully ruled out.

Relationship Between Perceived Effectiveness and Posttest Teacher Self-Efficacy

A correlation analysis was conducted as a secondary analysis to examine the relationship between teachers' perceived effectiveness of SPS and posttest teacher self-efficacy. The results showed positive and significant associations across all self-efficacy dimensions. Teachers who perceived SPS as clearer, more practical, and more useful tended to report higher self-efficacy after implementation. This result suggests that teachers' positive experience of the SPS process was associated with stronger posttest self-efficacy. However, because the analysis was correlational, the association should be interpreted as relational evidence rather than as evidence that perceived effectiveness directly increased self-efficacy.

Table 9. Correlation Between Perceived Effectiveness and Posttest Teacher Self-Efficacy

Variables	r	p	Interpretation
Perceived effectiveness and student engagement	.49	< .001	Moderate positive association
Perceived effectiveness and instructional strategies	.53	< .001	Moderate positive association
Perceived effectiveness and classroom management	.47	< .001	Moderate positive association
Perceived effectiveness and total self-efficacy	.55	< .001	Moderate positive association

This association should be interpreted as complementary evidence rather than as causal evidence. The correlation suggests that teachers' positive perceptions of the SPS supervision process were related to stronger posttest self-efficacy, but it does not prove that perceived effectiveness directly caused higher self-efficacy. Therefore, the correlation results were interpreted together with observation notes and teacher reflection forms to provide a more contextual understanding of how teachers experienced the SPS supervision cycle, consistent with mixed-methods integration in which quantitative and qualitative evidence are used to inform interpretation (McCrudden et al., 2021).

Qualitative Evidence from Observation and Reflection

Qualitative findings from observation notes and teacher reflection forms supported the quantitative results. The data showed that teachers experienced SPS as a more supportive and participatory form of supervision. Three main themes emerged from the qualitative analysis: supportive supervision climate, active teacher agency, and practical instructional improvement. These themes were used to contextualize the quantitative findings rather than to stand as separate qualitative results. Supportive supervision climate helped explain the high score in the Support dimension, active teacher agency helped explain the strongest score in the Participant dimension, and practical instructional improvement helped explain teachers' positive perception of the Skill dimension. In this way, the qualitative evidence strengthened the interpretation of the feasibility, perceived effectiveness, and self-efficacy results.

Table 10. Qualitative Themes Supporting SPS Implementation

Theme	Main finding	Related SPS dimension
Supportive supervision climate	Teachers perceived feedback as more constructive and less judgmental	Support
Active teacher agency	Teachers were more involved in co-planning, reflection, problem identification, and decision-making	Participant
Practical instructional improvement	Teachers reported clearer strategies for lesson planning, active learning management, feedback use, and reflective improvement	Skill



The observation and reflection data indicated that the co-planning stage helped teachers prepare lessons more intentionally, while classroom observation provided concrete evidence for feedback discussion. Dialogic feedback was perceived as useful because it allowed teachers to discuss instructional problems without feeling evaluated in a punitive manner. Reflection forms also showed that teachers valued the opportunity to identify teaching strengths, recognize areas for improvement, and plan follow-up actions. These qualitative findings help explain why the Participant dimension received the highest score and why teacher self-efficacy increased after the SPS supervision cycle. The convergence between quantitative and qualitative findings indicates that the improvement in teacher self-efficacy was supported by teachers' reported experiences of constructive feedback, active participation, and practical instructional refinement. This integration strengthened the interpretation of the results by showing not only that self-efficacy scores increased, but also how teachers experienced the supervision process that accompanied the increase, consistent with the use of joint displays and mixed-methods integration to support inferential transparency (Guetterman et al., 2021; McCrudden et al., 2021).

Summary of Results

Overall, the findings indicate that the SPS collaborative supervision model was valid, feasible, and perceived as effective as a school-based continuing professional development model in Physical Education. The model also showed a significant positive change in teacher self-efficacy from pretest to posttest, with large effect sizes across student engagement, instructional strategies, classroom management, and total self-efficacy. In addition, the positive association between perceived effectiveness and posttest self-efficacy suggests that teachers who experienced SPS as useful also tended to report stronger confidence after the supervision cycle. Taken together, the quantitative and qualitative findings suggest that SPS helped reposition supervision from a one-way evaluative activity into a collaborative professional learning process that supports teacher self-efficacy and reflective teaching practice. However, the results should be understood as developmental and field-trial evidence rather than definitive experimental evidence. The main contribution of the results is that they show the feasibility, perceived usefulness, and promising association of SPS with teacher self-efficacy, while also indicating the need for future controlled or longitudinal studies to test its sustained effectiveness.

Discussion

The findings suggest that the SPS collaborative supervision model can function as a school-based continuing professional development framework in Physical Education. This is indicated by strong expert validation, high field-trial feasibility, high perceived effectiveness, and increased teacher self-efficacy after implementation. The field trial showed that SPS was perceived as very feasible and very effective, while teacher self-efficacy increased from pretest to posttest across student engagement, instructional strategies, and classroom management. These results indicate that SPS is not only procedurally feasible, but also pedagogically meaningful for supporting teachers' confidence in Physical Education-oriented practice. Rather than treating supervision as a compliance-oriented activity, SPS repositioned supervision as a collaborative professional learning process, which is relevant for Physical Education teachers who must manage movement-based learning, student safety, classroom activity, feedback, and student engagement (Ahraz, 2025; Latino et al., 2024; I. Setiawan, 2024). More critically, the findings indicate that the form of supervision matters. When supervision is organized as a supportive, participatory, and skill-oriented process, it can move beyond administrative monitoring and become a mechanism for professional learning. This is important because recent studies on Physical Education teacher development emphasize that professional learning should be sustained, contextualized, and connected to teachers' real instructional practice rather than limited to short-term training or formal workshops (Ahraz, 2025; M. N. A. Setiawan et al., 2024; Ventista & Brown, 2023).

The increase in teacher self-efficacy after participation in the SPS supervision cycle suggests that collaborative supervision may support teachers' professional confidence when it is embedded in concrete teaching practice. Through co-planning, classroom observation, dialogic feedback, reflection, and instructional refinement, teachers received opportunities to identify instructional problems and improve their teaching strategies. Theoretically, the SPS model explains how supervision may strengthen teacher self-efficacy by combining emotional and instructional support, teacher agency, and mastery-oriented



feedback within a repeated professional learning cycle. In Physical Education, this process is important because teachers must motivate students with varied interests in physical activity, manage active and safe learning environments, and adapt instruction to diverse student abilities. This aligns with studies showing that teacher self-efficacy is closely related to professional development, instructional readiness, motivation, and resilience in Physical Education contexts (Kusmiyati et al., 2024; Ma et al., 2025; Magill et al., 2023, 2024; Spittle et al., 2023). The contribution of SPS is therefore not limited to increasing teachers' confidence scores, but also to explaining how confidence may develop through situated professional experience. Support provides a psychologically safer supervision climate, participation strengthens teacher agency, and skill-focused coaching provides opportunities for mastery experience through practical instructional refinement.

The strongest result in the Participant dimension indicates that teacher agency was central to the perceived usefulness of SPS. The high score of this dimension shows that teachers valued being positioned as active professional actors rather than passive objects of supervision. Teachers responded positively when they were involved in co-planning, reflection, problem identification, and instructional decision-making. This finding suggests that participation is not only a procedural element of supervision, but also a psychological mechanism that strengthens ownership, motivation, and confidence. It is consistent with recent Physical Education literature emphasizing active teacher involvement, reflective practice, mentoring, and pedagogical participation as important elements of meaningful professional learning (Herrera et al., 2024; Kaloudis et al., 2025; Marín et al., 2025; Poblete-Valderrama et al., 2024). This finding also clarifies why SPS differs from supervision models that mainly emphasize observation and evaluation. In SPS, participation is positioned as the core mechanism through which teachers negotiate instructional problems, interpret classroom evidence, and design improvement actions. As a result, supervision becomes a dialogic process rather than a one-way judgment of teacher performance.

The Skill and Support dimensions also contributed to the model's perceived usefulness. The Skill dimension helped teachers improve practical teaching competencies through observation, coaching, feedback, and reflection, especially in lesson planning, active learning management, student engagement, and feedback use. This finding indicates that supervision in Physical Education should move beyond document checking and general classroom evaluation toward pedagogical coaching that is specific to movement-based learning. The slightly lower score in the Support dimension should not be read as a weakness of the model, but as evidence that institutional support is more dependent on school-level conditions such as leadership, supervision culture, facilities, and teacher workload. Thus, SPS may work best when school leaders provide sufficient time, resources, and a supportive climate for reflective supervision (Luo et al., 2025; Martín-Rodríguez & Madrigal-Cerezo, 2025; Mohammed et al., 2025; Nurhayati et al., 2025; Rubiana et al., 2025). This interpretation is important because school-based CPD depends not only on the quality of the model, but also on the institutional conditions that allow teachers to participate meaningfully in supervision, feedback, and reflective improvement. Therefore, successful SPS implementation requires alignment between the supervision cycle and school-level support systems.

The findings also strengthen the argument that continuing professional development in Physical Education should not rely only on workshops or short-term training. While workshops may introduce new concepts, they may not be sufficient to change teachers' confidence and practice if they are disconnected from real classroom experiences. SPS offers an alternative by embedding professional development in teachers' own instructional contexts through repeated cycles of planning, observation, feedback, and reflection. This makes supervision more connected to real classroom problems and more useful for improving Physical Education teaching practice. Recent studies also emphasize that teacher development in Physical Education should be sustained, contextualized, reflective, and connected to instructional realities rather than treated as one-off training (Ahraz, 2025; Latino et al., 2024; I. Setiawan, 2024; Woodcock & Hardy, 2025). In this sense, SPS contributes to the CPD literature by showing that supervision can become a vehicle for professional development when it is structured around teacher participation, reflective dialogue, and practical skill improvement. This extends recent discussions on Physical Education professional development, which have focused on online professional learning, digital competence, TPACK, and pedagogical practice, by placing collaborative supervision itself as the central CPD mechanism (Nurhayati et al., 2025; Poblete-Valderrama et al., 2024; M. N. A. Setiawan et al., 2024).

The qualitative findings help explain the quantitative results. Teachers' reflections and observation notes indicated that the co-planning stage supported more intentional lesson preparation, classroom



observation provided concrete evidence for discussion, dialogic feedback reduced the feeling of being judged, and reflection helped teachers identify strengths and areas for improvement. These findings suggest that SPS created a safer professional learning climate, where feedback was experienced as support rather than administrative judgment. This is especially important in Physical Education, where teachers must make quick pedagogical decisions in dynamic and active learning environments. The positive association between perceived effectiveness and posttest teacher self-efficacy also suggests that teachers who experienced SPS as clear, practical, and useful tended to report stronger confidence after implementation. However, this association should be interpreted as complementary evidence, not as causal proof (Kaloudis et al., 2025; Martín-Rodríguez & Madrigal-Cerezo, 2025; Nurhayati et al., 2025; Ortíz et al., 2025). This triangulation provides a more complete explanation of how SPS functioned during implementation, although it still does not establish causal effectiveness, consistent with mixed-methods integration in which quantitative and qualitative findings are connected to strengthen interpretation (Guetterman et al., 2021; McCrudden et al., 2021)

The main contribution of this study lies in positioning SPS as a supervision-based continuing professional development model for Physical Education. Many professional development initiatives focus on training, digital competence, or general pedagogical innovation, while supervision is often treated as administrative control. SPS offers a different orientation by transforming supervision into a collaborative learning cycle that integrates Support, Participant, and Skill as mutually reinforcing dimensions. This contribution is relevant to vocational schools, where Physical Education supports not only physical activity and health, but also teamwork, discipline, responsibility, resilience, and socio-emotional development. Accordingly, this study contributes to the thematic areas of continuing teacher education and Physical Education methodology by showing how supervision can become a structured mechanism for strengthening teacher self-efficacy and reflective teaching practice (Herrera et al., 2024; Luo et al., 2025; Ortíz et al., 2025; Rubiana et al., 2025). The theoretical contribution of SPS is the integration of three mechanisms that are often discussed separately in professional development literature: support as a condition for psychological and instructional safety, participation as a basis for teacher agency, and skill-focused coaching as a pathway for practical instructional improvement. The practical contribution is that SPS offers schools a supervision cycle that can be implemented through co-planning, observation, dialogic feedback, reflection, and instructional refinement.

Despite these contributions, the findings should be interpreted with caution. This study used a developmental R&D design with an embedded one-group pretest–posttest evaluation; therefore, causal interpretation should be made carefully because no control group was included. Teacher self-efficacy and perceived effectiveness were also measured partly through self-report instruments, which may be influenced by subjective perception. Future research should use comparative or longitudinal designs, include repeated SPS supervision cycles, and examine whether improvements in teacher self-efficacy are followed by measurable changes in instructional quality and student outcomes. The pretest–posttest findings indicate improvement after SPS participation, but they cannot rule out alternative explanations such as teacher motivation, previous professional experience, school leadership, concurrent professional development activities, or contextual differences among schools. Future research should therefore test SPS using stronger designs, such as controlled field trials, longitudinal studies, or repeated-cycle implementation, and should examine whether teacher-level changes are followed by student-level outcomes such as engagement, physical literacy, motor skill development, and learning achievement.

Overall, SPS shows strong potential as a continuing professional development framework in Physical Education, particularly when implemented as a supportive, participatory, and skill-oriented supervision cycle. Its main strength lies in repositioning supervision from a one-way evaluative activity into a collaborative, reflective, and skill-oriented professional learning process. By integrating structured support, active teacher participation, and practical teaching improvement, SPS can help strengthen teacher self-efficacy and support more meaningful Physical Education-oriented professional development in vocational school contexts. However, the value of SPS should be understood as developmental and contextual rather than universally conclusive. The findings show that SPS is feasible, perceived as useful, and associated with improved teacher self-efficacy in the present field-trial context. Further research is needed to examine whether the model remains effective across different school systems, longer implementation periods, and more diverse Physical Education settings.



Conclusion

This study demonstrates that the SPS collaborative supervision model can serve as a school-based continuing professional development framework for strengthening teacher self-efficacy in Physical Education. By integrating Support, Participant, and Skill, the model shifts supervision from a one-way evaluative practice toward a collaborative, reflective, and skill-oriented professional learning process. The findings showed that SPS was valid, feasible, and perceived as effective, and that teacher self-efficacy increased after participation in the supervision cycle, particularly in student engagement, instructional strategies, and classroom management. These results suggest that supervision becomes more meaningful when teachers receive structured support, participate actively in instructional decision-making, and engage in feedback-based reflection. In vocational school contexts, SPS offers a practical framework for helping Physical Education teachers strengthen confidence and improve teaching practices related to movement-based learning, student safety, active participation, and reflective improvement. Future research should examine SPS using comparative or longitudinal designs and explore its impact on student-level outcomes, including engagement, physical literacy, and learning achievement in Physical Education.

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