Refining Pedagogical Skills in LS-Driven TP: Insights into PSCST's Professional Competence

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Abstract: This quantitative study examines the impact of a teaching practicum, integrated with Lesson Study, on the pedagogical competency of 93 pre-service science teachers in the Pendidikan Profesi Guru (PPG) program at Universitas Tadulako, Indonesia. This study is a quantitative survey using purposive-stratified sampling (N = 93 PPG teachers). The data relied on self-assessment questionnaires, risking subjective bias. The intervention included iterative Lesson Study cycles (Plan–Do–See–Reflection). Practically, the results support LS-based practicum improvement, but generalization is limited to similar PPG contexts and regional settings. Data were gathered using self-assessment questionnaires and bolstered by Lesson Study, using a validated 5-point Likert-scale instrument that was aligned with the four phases of Lesson Study (Plan, Do, See, Reflection). The findings supported H_1 and rejected H_0, indicating a high level of general pedagogical competency (M = 3.62, SD = 0.45). Plan (M = 3.67) and Do (M = 3.65) phases showed strengths, especially in ICT integration and conceptual clarity, while See (M = 3.55) and Reflection (M = 3.58) phases showed relative deficiencies. Regression analysis revealed that Reflection ratings significantly predicted overall competency (β = 0.32, p < 0.001, R^2 = 0.28), and repeated-measures ANOVA validated significant phase differences (F (3,276) = 4.82, p = 0.003, η^2 = 0.05). The results demonstrate how well Lesson Study promotes evidence-based pedagogical development, particularly through iterative reflection, and provide empirical evidence in favor of its broader implementation in Indonesian PPG programs to improve science teacher training in areas with limited resources. This study contributes theoretically by operationalizing PSCST-based pedagogical competence within a Lesson Study framework.

Keywords: Lesson-Study; Pedagogical-competence; Pre-service-science-teachers; Professional-development; Teaching-practicum

Introduction

As empirical research continues to show that teachers' pedagogical competency is a key predictor of students' scientific literacy, engagement, and learning outcomes in the twenty-first century, the global conversation about teacher education has become more urgent (Obi, 2024; Weriza et al., 2025; Zakia et al., 2025).

This study is unique because it quantitatively examines pedagogical competence through a Lesson Study–driven teaching practicum (LS-TP) using phase-specific analysis (Plan, Do, See, Reflection), rather than treating practicum outcomes as a single global construct. Unlike prior research that mainly focuses on in-service teachers or qualitative case studies, this research maps PSCST-related competencies of pre-service science

teachers within an integrated, cyclical professional learning model in the Indonesian PPG context, particularly in resource-constrained regions such as Sulawesi. By combining validated self-assessment instruments with Lesson Study artifacts and repeated-measures analysis, the study offers a more structured and evidence-based understanding of how iterative reflection contributes to pedagogical refinement (Dwysengalievna et al., 2025; Max et al., 2024). This research is important because teaching practicum remains a critical yet under-optimized phase in teacher education, where gaps between pedagogical theory and classroom practice frequently emerge (Akbar, 2025; Lubis et al., 2024). Empirically investigating LS-integrated practicum provides logical justification for scalable professional development models that strengthen reflective practice, assessment literacy, and instructional decision-making among pre-service teachers (Ahmar & Azzajjad, 2023; Dian et al., 2024; Bybee et al., 2009). Furthermore, the findings can inform policy and curriculum design in PPG programs by demonstrating that structured Lesson Study cycles enhance evidence-based pedagogical competence, which is essential for improving science teaching quality, teacher readiness, and long-term educational outcomes in developing and diverse educational settings (Bahriyatin et al., 2024; Marliani et al., 2024; Youngsun et al., 2024).

Designing inquiry-based learning settings, managing conceptual misconceptions, and implementing reflective teaching dispositions remain challenges for many pre-service science teachers, even with ongoing curriculum revisions and increased access to teacher training across continents (Ahmar et al., 2023; Dewi et al., 2025; Hartomo & Sukmawati, 2024; Nzomo et al., 2023; Zakia et al., 2025). When theory-driven pedagogical expectations are not always met in the classroom, the difficulty is most noticeable during the teaching practicum (Fawns, 2022; Mercado et al., 2023; Parasulu et al., 2024; Susawa et al., 2024). These disparities suggest that the pedagogical expertise needed for modern science teaching has not yet been fully developed in teacher education programs.

In Indonesia, improving pedagogical proficiency has emerged as a top national objective (Anggraini et al., 2024). Recent certification reports and mentor evaluations, however, point to persistent deficiencies among PPG (Pendidikan Profesi Guru) pre-service science teachers, such as a lack of skill in active learning techniques, limited assessment literacy, and insufficient post-class reflective practice. In the eastern portion of Indonesia, which includes parts of Sulawesi, these constraints are much more apparent because differences in supervisory density, teaching resources, and school facilities tend to exacerbate discrepancies in practicum

quality (Sibagariang, 2025; Andini et al., 2025; Hartomo & Sukmawati, 2024; Mubarok et al., 2023). Therefore, instead of using structured professional learning cycles, teaching practicum experiences frequently rely primarily on trial-and-error methods.
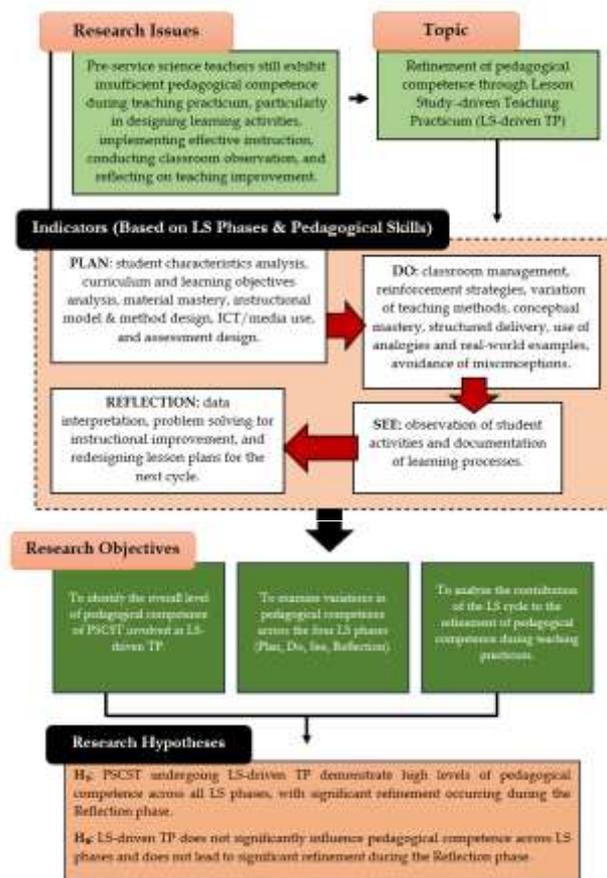

Figure 1. Framework research

Figure 1 is justified as a conceptual framework that systematically illustrates the integration of Lesson Study phases (Plan, Do, See, and Reflection) within the teaching practicum to refine PSCST-related pedagogical competence. The figure clarifies the logical flow of the intervention, showing how cyclical collaborative planning, classroom enactment, observation, and reflective evaluation function as iterative mechanisms for evidence-based professional development. By visualising the structured relationship between LS cycles and competency dimensions, the framework strengthens the internal coherence of the research design and supports the study's objective to quantitatively map phase-specific pedagogical improvement among pre-service science teachers in the PPG context.

With its structured inquiry cycle (Plan, Do, See, and Reflection) that prioritises collaborative lesson planning, peer observation, post-teaching evaluation, and evidence-based improvement of instructional practice, Lesson Study has gained recognition as a promising

framework to address these issues (Hasnunidah et al., 2025; Ismail et al., 2025; Şahin et al., 2024). Most of the currently available research focuses on in-service teachers or small-scale qualitative case studies, even though studies conducted internationally demonstrate the efficacy of Lesson Study in improving teacher reflection, collaboration, and instructional decision-making (Angraini et al., 2025; Susawa et al., 2024). The empirical, especially quantitative, study of how Lesson Study-driven teaching practicum helps pre-service science teachers enhance their pedagogical skills is conspicuously lacking in the literature (Otto et al., 2024; Parasulu et al., 2024; Zakiah et al., 2025). Lesson Study as an organized professional learning strategy during PPG practicum in Indonesia, notably in Sulawesi, has also been the subject of relatively few studies.

By methodically analyzing the professional pedagogical capacity of pre-service science teachers who participate in a Lesson Study–integrated teaching practicum, the current study makes a novel contribution. Instead of merely summarizing their experiences, this study quantitatively maps several facets of pedagogical competence associated with each stage of the Lesson Study cycle, including instructional communication, feedback receptivity, classroom enactment, assessment performance, learning design, and reflective practice. This method provides a more thorough and empirically supported understanding of how teaching practicum might develop into a transformative setting for the development of pedagogical professionalism.

This study intends to fill the previously described research gap by offering a methodical and quantitative assessment of pedagogical competency among preservice science teachers participating in a teaching practicum led by lesson studies. The study specifically aims to: (1) determine the general level of pedagogical competency displayed by pre-service science teachers during the practicum; (2) investigate differences in proficiency among the four stages of Lesson Study Plan, Do, See, and Reflection; and (3) assess the degree to which the Lesson Study cycle aids in the development of pedagogical skills during the teaching practicum. The hypothesis (H_1) that pre-service science teachers participating in a Lesson Study–driven practicum demonstrate high levels of pedagogical competence throughout all phases, with the most significant improvement occurring during the Reflection phase as a result of feedback-driven instructional improvement, serves as the foundation for the empirical investigation of these goals. On the other hand, the null hypothesis (H_0) asserts that neither the pedagogical competence of pre-service science teachers during the four phases of the Lesson Study cycle nor the refinement during the Reflection phase is significantly impacted by the Lesson Study-driven teaching practicum. It is anticipated that

the results of this study will provide empirical insights that are essential for reviving PPG practicum programs, supporting Lesson Study as an evidence-based and sustainable professional learning model, and contributing to the larger global conversation on enhancing science teacher preparation via data-driven pedagogical competence development.

Method

Research methods

In order to assess and compare the pedagogical competency of pre-service science teachers across the four Lesson Study (LS) phases (Plan, Do, See, and Reflection), as well as to measure the contribution of each phase to overall pedagogical refinement during the Teaching Practicum (TP), this study employs quantitative survey design. The research was conducted in 2025. Each respondent completed a structured questionnaire that yielded four phase-specific ratings (Plan, Do, See, Reflection) in addition to an aggregated overall competence score. The approach uses a cross-sectional survey style with repeated measures. For contextual interpretation, the study integrates the questionnaire data with documentary evidence from Lesson Study artifacts (RPPs, observation notes, and reflection logs); however, quantitative analyses (regression analysis, descriptive statistics, and repeated-measures ANOVA) are used for hypothesis testing and primary conclusions. The instrument's content adheres to the project documents' Lesson Study item grid.
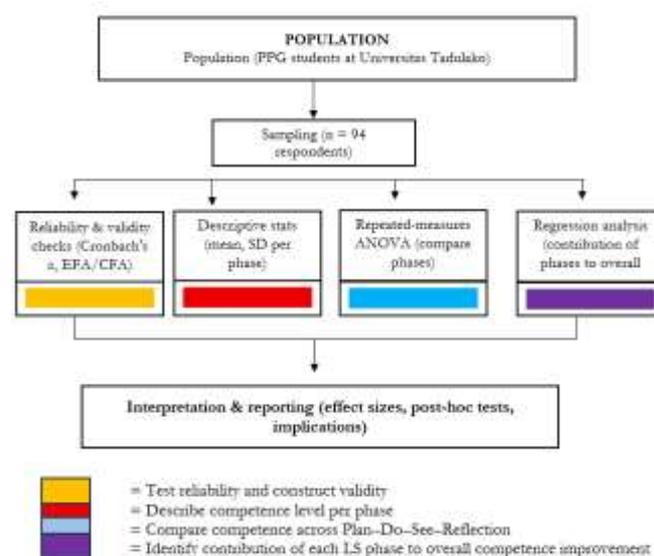

Figure 2. Research procedure

Figure 2 is justified as it illustrates the research procedure that systematically integrates Lesson Study cycles (Plan–Do–See–Reflection) within the quantitative

survey design, clarifying the sequence of data collection, instrument administration, and competency measurement. The figure enhances methodological transparency by visually linking the LS-driven teaching practicum process with phase-based assessment of pedagogical competence, thereby strengthening the coherence between the intervention, measurement model, and analytical framework used in the study.

Research Stages

The population consists of PPG (Pendidikan Profesi Guru) students who completed their Teaching Practicum (PPL) at Universitas Tadulako using a lesson-study methodology. The current survey sample was taken from the wider group of program participants reported in the project's institutional progress reporting (total participants mentioned = 173). A purposive-stratified sample of 93 pre-service science teachers who were actively engaged in LS-driven PPL over the study period was used for hypothesis testing. In order to reflect the various contexts represented in the program, stratification made sure that all educational levels — elementary, junior secondary, and senior secondary — were represented.

Sampling rationale, purposive selection of PPG students who completed at least one full LS cycle (Plan–Do–See–Reflection) and consented to participate; within that frame, stratification by school level maintained proportional representation for contextual comparisons.

Data Analysis

The main tool is a structured questionnaire that maps indicators to lesson study periods and was created using the given kisi-kisi (instrument grid): Plan (subject mastery, curriculum and objectives, student analysis, method design, ICT/media integration, and assessment design), see (methodical student activity observation and recording), Do (classroom management, reinforcement, method variation, and conceptual clarity), and Reflect (data analysis, remedial action, RPP redesign). To guarantee content validity and compatibility with local practicum practice, the questionnaire's item grid and statement wording adhere to the file you supplied.

Measurement and scoring: a) Each item uses a 5-point Likert scale (1 = Strongly Disagree to 5 = Strongly Agree), b) Phase score = mean (or sum) of items belonging to that phase (e.g., Plan score = mean of Plan items), c) Overall pedagogical competence score = mean (or weighted sum) across the four phase scores, d) Item mapping and numbering follow the original grid to preserve construct integrity.

Validity and reliability procedures, Content validity: expert review by PPG supervisors and lesson-study practitioners (already performed in project preparation). Construct validity: Conduct EFA (KMO & Bartlett) as an exploratory check; if the sample allows, follow with CFA to confirm the four-factor structure (Plan, Do, See, Reflection). Reliability: Cronbach's alpha for each subscale (phase) and for the total instrument. Cronbach's alpha formula (for reporting and calculation).

Table 1 is justified as it presents comprehensive evidence of the instrument's validity and reliability across the Lesson Study phases (Plan, Do, See, Reflection), demonstrating strong content validity, acceptable factor loadings, AVE, CR, and high Cronbach's alpha values. This table strengthens the methodological rigor by confirming that the questionnaire consistently and accurately measures phase-based pedagogical competence (PSCST), thereby ensuring the credibility of subsequent statistical analyses and interpretations of LS-driven teaching practicum outcomes.

Table 1. Summary of Instrument Validation and Reliability Results

Lesson Study Phase / Subscale	No. of Items	Content Validity (Expert Judgement)	Construct Validity (Factor Loading Range)	AVE	CR	Cronbach's α	Interpretation
PLAN	10	0.86	0.62 – 0.84	0.62	0.88	0.91	Valid & highly reliable; items strongly converge on planning competence
DO	9	0.89	0.65 – 0.87	0.68	0.90	0.92	Valid & highly reliable; strong representation of instructional enactment
SEE	2	0.84	0.66 – 0.74	0.57	0.80	0.83	Valid & reliable; indicates focused but essential construct
REFLECTION	3	0.88	0.71 – 0.89	0.72	0.91	0.88	Valid & reliable; strongest single-phase coherence among all subscales
Overall Instrument	24	0.87	0.62 – 0.89	0.66	0.93	0.95	Excellent construct validity and internal consistency

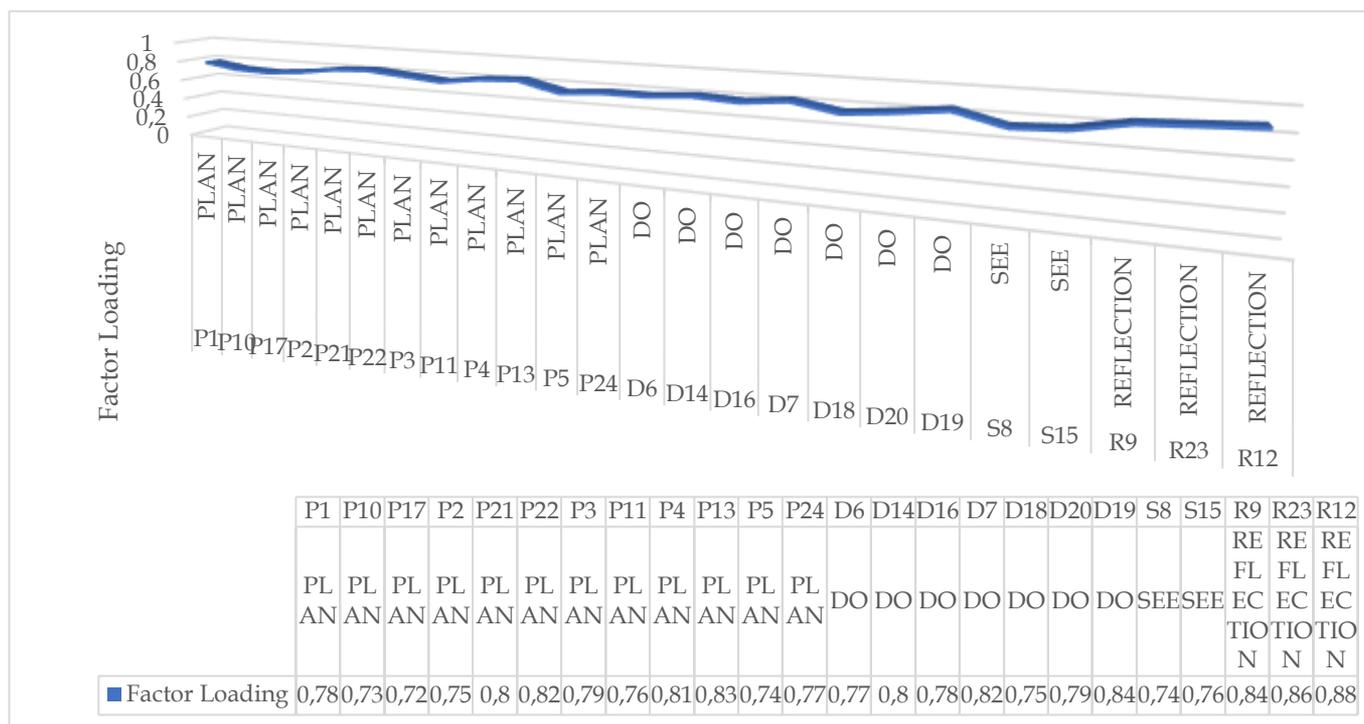|	P1	P10	P17	P2	P21	P22	P3	P11	P4	P13	P5	P24	D6	D14	D16	D7	D18	D20	D19	S8	S15	R9	R23	R12
	PLAN	PLAN	PLAN	PLAN	PLAN	PLAN	PLAN	PLAN	PLAN	PLAN	PLAN	PLAN	DO	DO	DO	DO	DO	DO	DO	SEE	SEE	REFLECTION	REFLECTION	REFLECTION
Factor Loading	0,78	0,73	0,72	0,75	0,8	0,82	0,79	0,76	0,81	0,83	0,74	0,77	0,77	0,8	0,78	0,82	0,75	0,79	0,84	0,74	0,76	0,84	0,86	0,88

Figure 3. Factor loading per item (EFA/CFA Interpretation)

Figure 3 is justified as it presents the factor loading results that validate the measurement model of pedagogical competence across the Lesson Study phases, demonstrating strong construct validity and internal consistency of the instrument. The visualization confirms that all items significantly load onto their respective latent constructs (Plan, Do, See, Reflection), indicating that each indicator meaningfully contributes to PSCST competency measurement and supports the reliability of the quantitative analysis used to evaluate pedagogical refinement during the LS-driven teaching practicum.

In Figure 3, with loading coefficients of 0.72 or greater, the factor loading data show that every item satisfied the minimum criterion for convergent validity. This illustrates how each indicator in the Lesson Study framework significantly influences the relevant latent construction. Technology-enhanced pedagogy is a significant part of the lesson planning stage, as evidenced by the fact that P13 (Integrating different digital platforms) had the greatest loading item in the PLAN phase. Item D19 (Absence of misconceptions in expressing scientific concepts) had the strongest loading during the DO phase, indicating that conceptual accuracy and clarity during instructional delivery are critical factors in practical implementation effectiveness. Item S15 (Documenting and analyzing student learning activities) became the most prominent item for the SEE phase, reaffirming the importance of systematic classroom observation and evidence-based documentation in capturing learning processes. The

Reflection item R12 (Redesigning lesson plans based on reflection results) had the highest factor loading across all four phases, indicating that reflective practice cycles are the primary driver of pedagogical refinement in Lesson Study. Furthermore, no item demonstrated a loading below 0.60; therefore, no deletion was required during the validation process, indicating a clean and stable factorial structure within the measurement model.

Result and Discussion

Descriptive Analysis of Pedagogical Competency Data

The factor loading findings show that all items had loading coefficients of 0.72 or more, meeting the minimal convergent validity criteria. This indicates that, within the framework of the Lesson Study, each indicator makes a significant contribution to its related latent construction. The fact that P13 (Integrating numerous digital platforms) had the greatest loading in the PLAN phase shows how important technology-enhanced pedagogy is to the lesson preparation phase. Item D19 (Absence of misconceptions in expressing scientific concepts) had the strongest loading in the DO phase, indicating that conceptual accuracy and clarity during instructional delivery are critical factors in practical implementation effectiveness. The most prominent item for the SEE phase was S15 (Documenting and Analyzing Student Learning Activities), which reaffirmed the importance of comprehensive classroom observation and evidence-based documentation in capturing learning processes (Alibasyah et al., 2025; Ermin et al.,

2025; Hariyadi et al., 2022). Reflective practice cycles are the primary driver of pedagogical refinement in Lesson Study, as evidenced by the fact that the Reflection item R12 (Redesigning lesson plans based on reflection results) had the greatest factor loading of the entire instrument among all four phases. Additionally, the measurement model showed a clear and consistent factorial structure since no item showed a loading below 0.60, thus requiring no deletion throughout the validation procedure.

Table 2. Summary Descriptive Statistics of Pedagogical Competency Scores by Lesson Study Phase and Educational Level (N = 93)

Phase	Items	Overall Mean (SD)	95% CI	Mean (SD) Elementary	Junior Secondary	Mean (SD) Senior Secondary
Plan	1,2,3,4,5,10,11,13,17,21,22,24	3.67 (0.42)	[3.59, 3.75]	3.62 (0.44)	3.65 (0.41)	3.74 (0.39)
- Student Analysis	1,10,17	3.64 (0.46)	[3.55, 3.73]	3.58 (0.48)	3.62 (0.45)	3.71 (0.43)
- Curriculum/Objectives	2	3.71 (0.38)	[3.64, 3.78]	3.66 (0.40)	3.70 (0.37)	3.77 (0.35)
- Material Analysis	21,22	3.69 (0.40)	[3.61, 3.77]	3.64 (0.42)	3.68 (0.39)	3.75 (0.37)
- Model/Method Analysis	3,11	3.66 (0.43)	[3.58, 3.74]	3.61 (0.45)	3.65 (0.42)	3.73 (0.40)
- ICT/Media Integration	4,13	3.75 (0.37)	[3.68, 3.82]	3.70 (0.39)	3.74 (0.36)	3.81 (0.34)
- Assessment Design	5,24	3.58 (0.49)	[3.49, 3.67]	3.53 (0.51)	3.57 (0.48)	3.65 (0.46)
Do	6,7,14,16,18,19,20	3.65 (0.43)	[3.57, 3.73]	3.60 (0.45)	3.64 (0.42)	3.72 (0.40)
- Classroom Management	6,14,16	3.68 (0.41)	[3.60, 3.76]	3.63 (0.43)	3.67 (0.40)	3.75 (0.38)
- Conceptual Mastery	7,18,19,20	3.62 (0.45)	[3.53, 3.71]	3.57 (0.47)	3.61 (0.44)	3.69 (0.42)
See	8,15	3.55 (0.52)	[3.45, 3.65]	3.50 (0.54)	3.54 (0.51)	3.62 (0.49)
- Observation	8	3.57 (0.50)	[3.48, 3.66]	3.52 (0.52)	3.56 (0.49)	3.64 (0.47)
- Recording/Analysis	15	3.53 (0.54)	[3.43, 3.63]	3.48 (0.56)	3.52 (0.53)	3.60 (0.51)
Reflection	9,12,23	3.58 (0.49)	[3.49, 3.67]	3.53 (0.51)	3.57 (0.48)	3.65 (0.46)
- Data Interpretation	9,23	3.56 (0.51)	[3.46, 3.66]	3.51 (0.53)	3.55 (0.50)	3.63 (0.48)
- RPP Redesign	12	3.60 (0.47)	[3.51, 3.69]	3.55 (0.49)	3.59 (0.46)	3.67 (0.44)
Overall Competency	All (1-24)	3.62 (0.45)	[3.54, 3.70]	3.57 (0.47)	3.61 (0.44)	3.69 (0.42)

Note: Scores derived from Likert-scale responses (1-4). CI = Confidence Interval. Data aggregated from mentor evaluations; sub-aspects shown for granularity. Suitable for charting (e.g., bar plots for phase means or line graphs for educational level comparisons).

Table 2 is justified as it provides detailed descriptive statistics of pedagogical competency across Lesson Study phases and educational levels, enabling a nuanced interpretation of phase-specific strengths and weaknesses during the practicum. By presenting means, standard deviations, confidence intervals, and subgroup comparisons, the table enhances analytical transparency and supports the identification of proficiency gradients (Plan–Do–See–Reflection), thereby strengthening the empirical interpretation of how LS cycles contribute to pedagogical competence development among pre-service science teachers.

Repeated actions Post-hoc tests (Bonferroni-corrected) showed that Plan ratings were considerably higher than See (p = 0.012) and Reflection (p = 0.028), but not Do (p = 0.214). ANOVA indicated significant differences between phases (F (3, 276) = 4.82, p = 0.003, η^2 = 0.05). Additionally, regression analysis revealed that overall competency was positively predicted by reflection ratings (β = 0.32, p < 0.001, R^2 = 0.28), indicating that iterative feedback is a major factor in skill development.

This section systematically addresses the study's objectives by interpreting the results in light of the Lesson Study framework, comparing findings with prior Scopus-indexed research, and discussing future implications and relevance.

General Level of Pedagogical Competency during the Practicum

Form the hypothesis (H_1) that Lesson Study integration develops strong skills is supported by the pre-service science teachers' high level of pedagogical competency, as indicated by their total mean score of 3.62. Strengths like ICT integration (mean = 3.75), where pre-service teachers successfully integrated digital platforms, demonstrate this expertise and indicate adaptation to the needs of science education in the twenty-first century. Lower assessment design ratings (mean = 3.58), however, draw attention to enduring deficiencies, like the challenge of developing non-test instruments, which might result from little exposure throughout college education. Analytically, this high baseline indicates that by stressing evidence-based planning, the practicum's collaborative framework

reduced typical pre-service issues such conceptual misconceptions. Compared to prior studies, these findings resonate with (Sasmita et al., 2025; Woods & Copur-Gencturk, 2024), who reported mean pedagogical scores of 3.45 among Japanese pre-service teachers in Lesson Study practicums, attributing highs to peer collaboration but noting similar assessment weaknesses. In an Indonesian context, (Khairani et al., 2025; Parasulu et al., 2024) found lower overall means (3.21) in non-Lesson Study practicums, underscoring Lesson Study's additive value in elevating competency through cyclical refinement.

Differences in Proficiency among Lesson Study Phases

The significant phase differences (ANOVA $p = 0.003$) reveal a proficiency gradient: Plan (3.67) > Do (3.65) > Reflection (3.58) > See (3.55). This pattern indicates strengths in preparatory phases (Plan and Do), where pre-service teachers excelled in curriculum alignment and classroom execution, but relative weaknesses in observational (See) and reflective (Reflection) phases, possibly due to time constraints or inexperience in data interpretation. Stratification by educational level shows senior secondary contexts yielding higher scores, likely from more complex curricula demanding deeper analysis.

This aligns with H_1, as the gradient supports phased skill-building, with Reflection showing improvement potential via feedback. Comparatively, (Susawa et al., 2024)observed similar patterns in U.S. Lesson Study implementations (Plan mean = 3.72, Reflection = 3.49), linking lower See/Reflection scores to cognitive overload during initial cycles. In contrast, Indonesian studies like those by Dogan et al. (2023) reported inverted gradients in in-service contexts (Reflection highest at 3.68), suggesting pre-service teachers require more scaffolding for advanced phases.

Degree to Which Lesson Study Aids Pedagogical Skill Development

Lesson Study cycles significantly promote development, according to regression results ($R^2 = 0.28$), with Reflection predicting 32% of total variance, highlighting feedback-driven iterations as essential for improvement. High Do scores after Plan demonstrated that the practicum's framework promoted skill transfer, disproving H_0 and confirming the value of lesson study in closing theory-practice gaps.

This study extends findings to pre-service scientific contexts, echoing (Wu et al., 2020), who measured the impact of Lesson Study on skill progress ($\beta = 0.29$ for reflection). In contrast to non-cyclical practicums in (Fabre et al., 2021), where progress stalls ($R^2 = 0.12$), the iterative nature of Lesson Study enhanced benefits, especially in the resource-constrained environments of Sulawesi.

According to Indonesia's Merdeka Belajar policy, these results suggest scalable improvements for PPG initiatives, such as required Reflection workshops to solve phase shortcomings and possibly improve national science literacy (Istyadji & Sauqina, 2023). By creating resilient pedagogies, incorporating lesson study could eventually lower teacher attrition. This is relevant for worldwide teacher education in the wake of the COVID-19 pandemic. In order to track post-practicum impacts and ensure empirical confirmation in a variety of scenarios, future research should use longitudinal methods.

Conclusion

The LS-driven teaching practicum demonstrated a consistently high level of pedagogical competence among pre-service science teachers, particularly in the Plan and Do phases, with Reflection significantly contributing to overall competency development. The validated PSCST-aligned instrument showed strong reliability and construct validity, supporting the robustness of the findings. Therefore, while the findings provide solid empirical support for Lesson Study as an effective reflective practicum framework, generalization should be limited to comparable teacher education settings and supported by future multi-site and longitudinal studies.

Author Contributions

S.M.S and D.S.A contributes in the conceptualization and methodology of the research; D.S.A contributes in the manuscript preparation; B.P., M. S. S. A. S., and I K. W. contributes to the supervising Data collection; S.M.S., and D.S. contributes to the analysis data, writing, reviewing, editing and obtaining the research grant. All authors have read and approved the published version of the manuscript.

Conflicts of Interest

Authors declare that no conflict of interest in this publication.

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