

# Cultural and Linguistic Factors in the Effective Use of Lesson Study with Mathematics and Science Teachers in the Philippines

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## Abstract

Lesson Study (LS), originating in Japan, has earned international recognition as a professional development model renowned for its collaborative method of enhancing teaching practices. However, the implementation of LS in mathematics and science education faces significant challenges when contextual factors, such as cultural norms and socio-economic constraints, are not adequately addressed. This study highlights the critical problem of adapting LS in low socio-economic status (SES) settings, where existing strategies may fail to account for unique cultural and linguistic influences. Despite its proven success globally, research on LS's adaptability to such environments, particularly in the Philippines, remains limited, revealing a gap in the literature. This descriptive case study focuses on a low-SES private school in the Philippines to examine how cultural values—such as Smooth Interpersonal Relationships (SIR), *pakikisama* (group harmony), and *hiya* (modesty)—and bilingualism impact teachers' engagement in LS cycles. Over six months, data were collected through interviews, focus group discussions, and classroom observations with four mathematics and science teachers. Findings show that cultural norms often hinder open critique, a core component of LS, while language dynamics influence the depth of reflective discussions. The study underscores the significance of the Philippine educational and cultural context, offering insights into the challenges and opportunities of LS implementation in resource-constrained environments. By addressing these barriers through culturally responsive adaptations, this research provides valuable contributions to the broader body of knowledge on LS, particularly for educators and researchers seeking to replicate its success in similarly complex settings.

## Introduction

Lesson Study (LS) has gained international recognition as a collaborative and iterative model of professional development (PD) that empowers teachers to reflect on and refine their instructional practices. Originally developed in Japan, LS distinguishes itself from conventional, top-down PD models by emphasizing teacher-led inquiry, sustained collaboration, and evidence-based reflection (Groth, 2011). Its relevance is especially notable in mathematics and science education, where teachers must support deep conceptual understanding and critical thinking.

One of LS's central claims is that its emphasis on evidence-based reflection leads to improved student outcomes. Lewis, Perry, and Hurd (2009) provide empirical support for this claim in a U.S. context, demonstrating that LS deepened teachers' pedagogical content knowledge and led to observable gains in students' mathematical understanding. The authors document how iterative lesson refinement and structured peer feedback allowed teachers to develop more

precise instructional strategies, which in turn enhanced learners' grasp of mathematical concepts. This finding aligns with Kanauan and Inprasitha's (2013) study in Thailand, where the integration of LS with the Open Approach improved student engagement and conceptual thinking in mathematics classrooms. Together, these studies underscore that LS can positively influence student learning by fostering teaching practices grounded in collaborative reflection and direct observation of student responses.

In addition to learner benefits, LS has been widely recognized for its impact on teacher development. Cheung and Wong (2014), in their study of LS implementation in Hong Kong, found that participation in LS enhanced instructional planning and strengthened teacher agency. Teachers reported a greater sense of ownership over their professional growth, citing peer observations and collective goal-setting as crucial elements. Similarly, Ogegbo, Gaigher, and Salagaram (2019) observed that LS in South Africa improved collaboration among science teachers and helped them analyze classroom challenges through structured reflection. These studies illustrate that LS fosters a culture of mutual support and continuous improvement, which is essential for sustainable pedagogical transformation.

LS has also shown adaptability across diverse educational contexts. Its successful implementation in the United States (Lewis et al., 2009), Hong Kong (Cheung & Wong, 2014), Thailand (Kanauan & Inprasitha, 2013), and South Africa (Ogegbo et al., 2019) suggests that its core principles are both robust and versatile. However, despite its global diffusion, the introduction of LS into low socio-economic status (SES) environments—especially in culturally and linguistically diverse contexts like the Philippines—remains underexplored. Research by Elipane (2012, 2017) has highlighted LS's compatibility with the Philippine K to 12 curriculum reforms, yet questions remain regarding how cultural values such as Smooth Interpersonal Relationships (SIR), *pakikisama* (group harmony), and *hiya* (modesty) interact with the reflective and often critique-oriented nature of LS.

This study addresses this gap by investigating how Filipino cultural values and bilingualism shape teachers' engagement in LS cycles in a low-SES private school in the Philippines. By examining the interplay between local cultural norms and the reflective demands of LS, this research contributes to a more nuanced understanding of how globally recognized PD models can be adapted to context-specific realities. It also responds to calls for professional development frameworks that are not only effective but also culturally responsive and sustainable in resource-constrained settings.

Guided by this objective, the study explores the following research questions:

1. What cultural values are observed in Filipino teachers' engagement in LS cycles, and how do these values influence their participation?
2. How does Filipino and English bilingualism shape communication, collaboration, and decision-making within LS cycles?

These questions aim to illuminate the socio-cultural and linguistic factors that mediate the effectiveness of LS, offering practical insights for adapting the model to better support teacher development in similarly complex educational environments.

## Theoretical Background

### Professional Development in Science and Mathematics Education

Effective PD—defined as structured support for teacher learning that improves instructional practice and student outcomes—is foundational in science and mathematics education. Two widely cited frameworks underpin effective PD: Desimone’s (2009) Framework for Effective Professional Development and Guskey’s (2002) Model of Teacher Change. These models emphasize sustainability, collaboration, active learning, and alignment with teachers’ contextual needs. Both frameworks advocate for ongoing, school-based, and practice-oriented approaches to PD that enable teachers to reflect critically on their instructional practices.

Desimone (2009) highlights five core features of effective PD: content focus, active learning, coherence, duration, and collective participation. Similarly, Guskey (2002) underscores the importance of measurable impacts on student learning, arguing that changes in teacher beliefs and practices stem from observable changes in student outcomes. These frameworks provide a lens through which to evaluate teacher learning and guide the development of PD models aligned with real classroom challenges.

LS embodies many of these characteristics. It is sustained and cyclical, grounded in collaborative learning, and emphasizes evidence-based reflection. The principles of Desimone and Guskey are operationalized in LS through iterative processes of co-planning, observation, and reflection on "research lessons"—collaboratively designed lessons used as vehicles for professional inquiry and pedagogical improvement. As illustrated in the conceptual framework (see Figure 1), LS draws from these theoretical models while responding to contextual needs, making it a flexible and adaptable form of PD, particularly in culturally nuanced or resource-constrained environments.

### **Lesson Study as a Professional Development Model**

LS is a teacher-centered PD model that stands in contrast to more hierarchical approaches such as cascade training or expert-led workshops (Perry & Lewis, 2009; Guskey, 2002). Unlike these top-down models, LS empowers teachers as active agents of change by engaging them in a cyclical process of collaboratively designing a “research lesson,” observing its implementation, and reflecting on its effectiveness in real classrooms. This iterative structure promotes sustained, evidence-based improvement in instructional practice.

What makes LS compelling—especially in the context of mathematics and science education—is its focus on student thinking as the basis for professional inquiry. Rather than emphasizing teacher compliance or one-size-fits-all strategies, LS enables educators to co-construct and refine their lessons based on how students respond to specific instructional moves (Lewis et al., 2009; Groth, 2011). In doing so, LS operationalizes key PD principles like collaboration, content focus, and continuous learning (Desimone, 2009; Guskey, 2002).

### **Cultural Considerations in Lesson Study Implementation**

The importance of cultural inclusivity and sensitivity in PD models, particularly in science, technology, engineering, and mathematics (STEM) education, has been widely recognized. Research highlights how accounting for cultural and contextual factors in PD can significantly enhance teacher engagement and effectiveness. For instance, Lingard (2007) emphasizes the impact of cultural dynamics on pedagogy, while Mukwambo, Ramasike, and Ngcoza (2018) discuss how linguistic and cultural nuances can shape teacher interactions in PD contexts. These studies underscore the need for PD approaches that are culturally responsive, especially in diverse and under-resourced settings.

LS, originally developed in Japan, has been adapted globally with varying degrees of success. In many cases, adaptations have sought to address cultural and contextual barriers to its implementation. For example, Perry and Lewis (2009) highlighted efforts in North America to integrate LS into educational systems with distinct cultural practices, while Ogegbo et al. (2019) discussed modifications in South Africa that accounted for local teaching challenges. Such adaptations reflect a growing recognition that LS must be tailored to local contexts to realize its full potential.

In the Philippines, the predominant cultural value is "Smooth Interpersonal Relationships" (SIR), which is fundamentally defined by the emphasis on maintaining harmony within personal relationships, families, and the broader community (Wirth, 2018; Espinosa, 2024). SIR encompasses *pakikisama* (getting along) and *hiya* (modesty), strongly influence teacher interactions during LS cycles. While these values foster collegiality and group harmony, they can also inhibit the open critique essential for reflective practice in LS. Teachers often balance these cultural norms with the demands of LS, navigating the tension between maintaining harmonious relationships and engaging in constructive feedback (Elipane, 2011).

Previous research also highlights the influence of bilingualism on LS dynamics in the Philippines. Teachers often alternate between Filipino and English, using the former for nuanced and informal reflections and the latter for formal discussions or technical terminology, especially in the presence of researchers. While this bilingual approach enriches the reflective process, it can introduce cognitive challenges that impact the depth and spontaneity of discussions (Mukwambo et al., 2018).

Despite the theoretical alignment of LS with collaborative and reflective practices, its implementation in the Philippine context reveals the need for culturally responsive adaptations. While the integration of cultural sensitivity into LS frameworks is an ideal goal, evidence suggests that further modifications are necessary to fully address the specific challenges posed by Filipino cultural and linguistic norms. This study builds on existing literature to explore these challenges, emphasizing the importance of tailoring LS to local contexts to support meaningful professional development in diverse educational settings.

### **Conceptual Framework**

This study draws upon Desimone's and Guskey's frameworks to conceptualize Lesson Study as a culturally responsive, teacher-centered PD model. The framework (see Figure 1) illustrates how the LS cycle—consisting of collaborative planning, lesson implementation, and post-lesson reflection—is influenced by contextual factors such as cultural values (e.g., *pakikisama* and *hiya*), bilingual communication, and resource constraints. These factors shape how core PD principles (collaboration, reflection, and alignment with student needs) are enacted, thereby influencing teacher growth and instructional change.

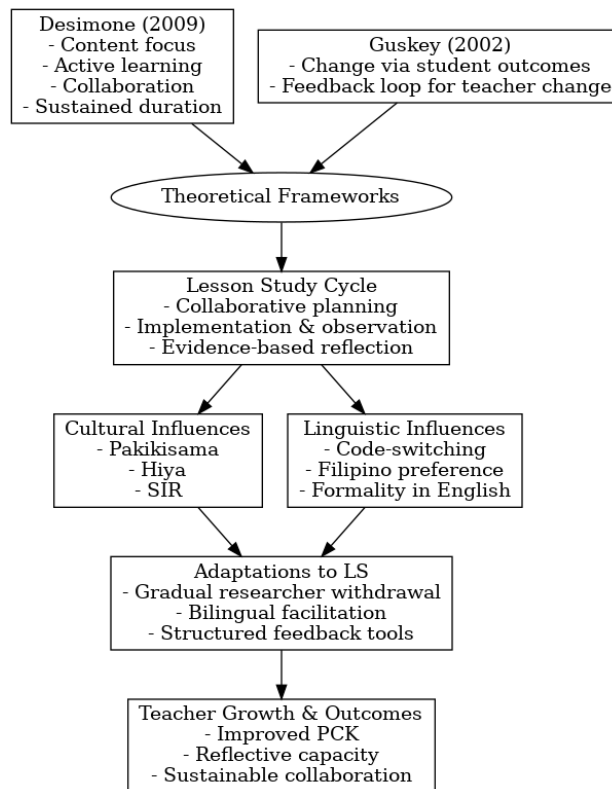


Figure 1. *Conceptual framework connecting Lesson Study to professional development theory and contextual influences.*

## Methodology

### Study Design

This study employed a descriptive case study design, a qualitative research approach that provides an in-depth exploration of complex phenomena within their real-life context (Yin, 2003). Descriptive case studies are particularly suited for examining situations where the boundaries between the phenomenon and its context are not clearly defined, making it an appropriate methodology for understanding the nuanced interactions between cultural, linguistic, and socio-economic factors in implementing LS.

According to Stake (1995) and Yin (2003), descriptive case studies involve collecting detailed, contextualized data to describe and interpret the phenomenon of interest comprehensively. This method is ideal for generating insights into the specific dynamics of LS in a low SES private school in the Philippines. The descriptive nature of the design allowed the researchers to document the cultural and linguistic factors influencing teacher participation in LS cycles, without manipulating or altering the environment.

### Participants

A group of four basic education teachers (i.e., those teaching at the kindergarten to senior high school levels; see Table 1) from a small private school in Antipolo City, Philippines, which serves a low SES community, participated in a LS project over six months. The study context and community background can be found in Appendix 1. Participation in the study was voluntary, and informed consent was obtained from all participants prior to their involvement. The participants were provided with clear information about the purpose of the research, the procedures, and their right to withdraw at any time without repercussions.

**Table 1. Demographics of the teacher participants for the study (in pseudonyms)**

| Teacher | Highest Degree obtained                                     | Experience in teaching in general | Years at school | Subject taught | Level Teaching             |
|---------|---|-----------------------------------|-----------------|----------------|----------------------------|
| Desiree | Bachelor of Secondary Education (Major in General Science)  | 10                                | 4               | Science        | Grades 1, 2, 3, 4, & 8     |
| Leah    | Bachelor of Secondary Education (Major in Physical Science) | 5                                 | 5               | Science        | Grades 5, 6, 7, 8, 9, & 10 |
| Arlyne  | Bachelor of Secondary Education (Major in Mathematics)      | 6                                 | 6               | Mathematics    | Grades 5, 6, 7, 8, 9, & 10 |
| Aian    | Bachelor of Elementary Education (Major in Mathematics)     | 7                                 | 7               | Mathematics    | Grades 3, 4, 5, 7, & 8     |

To ensure data privacy and confidentiality, all personal and identifying information was anonymized, and data was securely stored in accordance with ethical research standards of our university. Participation was incentivized with monetary compensation to acknowledge the teachers' time and effort, ensuring the amount was reasonable and designed to avoid coercion or undue influence. The research adhered to ethical principles of human data use, including compliance with applicable regulations and institutional guidelines of our University. This study has been cleared by the Research Ethics Committee (REC) of our university with REC code 2024-304.

### **Implementation of the Lesson Study Framework**

This study examined the implementation of the LS framework in a specific educational context, focusing on how cultural and linguistic factors influence its adoption and execution. Rather than introducing an intervention to measure pre- and post-implementation outcomes, this research observed the natural application of LS within a low SES private school in the Philippines. The study aimed to explore the dynamics of LS in this context, particularly in relation to Filipino cultural values and bilingual communication.

Building on the LS cycle described earlier, this study focused on how that process played out in a culturally nuanced, low-SES school in the Philippines. Rather than testing LS as a fixed intervention, researchers facilitated the first two cycles to model collaborative planning, implementation, and reflection. As teacher confidence grew, this support was gradually withdrawn, culminating in a fully teacher-led cycle by the end of the project.

In this study, researchers facilitated the initial stages of LS implementation to model the process and provide structured guidance. During the first two cycles, researchers supported planning sessions, introduced reflective prompts, and guided discussions to help participants engage deeply with the LS framework. As teachers gained familiarity with the process, researcher involvement was gradually reduced. By the third cycle, teachers began taking on greater responsibility for leading the discussions and planning. In the final cycle, teachers conducted

the LS process independently, demonstrating the feasibility of fully teacher-led LS in this context.

This study introduced a novel adaptation to the traditional LS model by implementing a gradual withdrawal of researcher support across LS cycles. Rather than functioning as a static intervention, this phased approach served as a scaffold to support teacher autonomy, allowing researchers to observe how participants adapted to LS with decreasing external guidance. This structure offered valuable insights into the sustainability of LS in resource-constrained environments. Additionally, the study highlighted how cultural values such as SIR and bilingual communication shaped teacher interactions, influencing their engagement with reflective practices and collaborative feedback.

By documenting these dynamics, the study offers a nuanced understanding of the cultural and contextual factors that influence the execution of LS. These findings contribute to the broader literature on professional development models, emphasizing the need for culturally responsive and contextually relevant adaptations of LS to support meaningful teacher growth in diverse educational settings.

### **Data Collection**

This study employed multiple qualitative methods to capture the complex, culturally embedded experiences of teachers engaged in the Lesson Study (LS) process. The primary data sources included focus group discussions (FGDs), classroom observations, individual interviews, and relevant lesson artifacts and reflective documents. These methods were selected to ensure a comprehensive understanding of how teachers navigated the LS framework, particularly in relation to cultural values and bilingual communication practices. Further details, including the full set of FGD questions and observation protocols, can be found in Appendix 2.

### **Data Analysis**

Thematic analysis (Braun & Clarke, 2013) was used to examine the qualitative data collected from FGDs, interviews, classroom observations, and artifacts. This approach enabled the identification of recurring patterns related to cultural influences, collaborative practices, and professional learning within the Lesson Study (LS) framework. A combination of inductive and deductive coding strategies was employed to allow both emergent themes and theory-driven insights to surface. The full coding framework, including detailed definitions, examples, and coding procedures, is provided in Appendix 3.

## **Findings and Discussion**

This section presents the findings organized around the study's key themes: cultural sensitivity in feedback, the impact of language on communication, professional growth through reflection, and challenges with content knowledge. The discussion integrates both qualitative insights and an analysis of how many participants engaged with each theme to provide clarity and context.

### **Cultural Sensitivity in Feedback**

The theoretical foundation of LS as a professional development model emphasizes reflective and collaborative practices, yet its implementation in different cultural contexts reveals unique adaptations driven by local norms and values. In the Philippines, cultural values such as *pakikisama* (getting along) and *hiya* (modesty or shame) significantly influence how teachers

engage in giving and receiving feedback during LS cycles. These values, integral to the broader cultural framework SIR, shape teachers' interactions, often prioritizing group harmony over critical analysis.

For instance, Desiree articulated, *"I didn't want to say too much about her lesson because it might sound too critical,"* reflecting an alignment with *pakikisama*, where maintaining harmony takes precedence. Similarly, teachers exhibited reluctance to openly critique peers' teaching practices, influenced by *hiya* and *pakikipagkapwa-tao* (regard for others' dignity and worth). This tendency is evident in Desiree's comment: *"I just have to be careful... instead of speaking, I'd rather not and just accept [their comments] instead of saying something wrong."* Leah reinforced this sentiment, noting, *"Oh, if I'm in that situation, it might also happen to me. I might not even be able to handle it. I feel that's how they think,"* showcasing a shared understanding of the cultural reluctance to provide direct feedback.

These cultural dynamics manifested in the post-lesson discussions, where feedback was predominantly framed in positive terms. For example, Desiree often provided encouraging remarks but avoided pointing out areas for improvement, limiting the depth of critique that LS ideally aims to achieve. Across the FGDs, three out of the four participants explicitly mentioned avoiding direct critique due to cultural norms, and all participants framed their feedback in predominantly positive terms. This inclination resulted in a limited depth of critique, with constructive feedback being less frequent than affirmative comments. These findings emphasize the tension between fostering collegiality and the need for critical, evidence-based discussions in LS.

The theoretical insights from the implementation of LS in culturally diverse settings, as highlighted by Mukwambo et al. (2018) and Elipane (2011), underscore the importance of cultural sensitivity and adaptive strategies. Introducing mechanisms like anonymous feedback forms or structured written reflections could address these cultural barriers, allowing Filipino teachers to express critical observations without the discomfort of face-to-face critique (Espinosa, 2024). Such adaptations would align with the core principles of LS while respecting the cultural inclination toward SIR, thereby fostering a more balanced and reflective professional development process.

### **Impact of Language on Communication**

The bilingual context of LS in the Philippines introduced a significant dynamic that shaped the depth and quality of teacher reflections, aligning with the theoretical emphasis on contextually relevant professional development (Saylor & Johnson, 2014). Teachers frequently expressed a preference for Filipino during reflective discussions, as it allowed for greater ease and authenticity in communication. Arlyne shared, *"I felt I could express myself better in Filipino, especially during feedback,"* underscoring how language comfort facilitates open and meaningful exchanges. This finding aligns with Mukwambo et al. (2018), who highlight the importance of acknowledging linguistic preferences in professional development settings to foster engagement and inclusivity.

However, the presence of a foreign researcher often led to code-switching, where teachers alternated between Filipino and English, particularly for technical terms or pedagogical concepts. While this shift allowed for precise articulation in certain contexts, it also introduced formality and hesitancy. As Arlyne noted, *"I felt somewhat limited in expressing myself in English during pre-lesson planning,"* illustrating how the cognitive demands of translation and self-editing can affect spontaneity and authenticity in contributions.



The analysis of language use during reflective discussions revealed that all four participants frequently alternated between Filipino and English, with three participants favoring Filipino for brainstorming and critique phases. Code-switching to English was observed among all participants, particularly during technical discussions or interactions with the foreign researcher. Linguistic shifts occasionally disrupted the fluidity of dialogue, as noted by three participants who expressed hesitations or made revisions when speaking in English. These findings align with Herrington's (2001) insights on the importance of tailoring professional development initiatives to the linguistic and cultural realities of participants.

To address these challenges and enhance the collaborative and reflective processes central to LS, providing materials and resources in both English and Filipino could be instrumental. Bilingual prompts and discussion guidelines could empower teachers to articulate their ideas in the language they find most comfortable, minimizing the cognitive burden of translation. Such adaptations reflect the theoretical principles of culturally and contextually responsive professional development, as highlighted by Dave and Matsuura (2019). By integrating bilingualism into LS implementation, future iterations can ensure that language dynamics enrich rather than inhibit reflective depth and the collaborative spirit of LS.

### **Professional Growth through Reflection**

The LS cycles provided a structured and collaborative framework for teachers to reflect on their teaching practices, fostering professional growth in alignment with the theoretical underpinnings of reflective practice in professional development (Lewis et al., 2009). This reflective process encouraged teachers to move beyond routine-based approaches to more intentional and evidence-based pedagogy. Leah, for instance, shared, *“I learned to think more about why I choose certain activities, not just what’s easy,”* highlighting a shift toward deeper pedagogical awareness.

While teachers appreciated the reflective opportunities afforded by LS, cultural norms influenced the depth of their self-critique. Observational notes revealed that while teachers were open to reflecting on their teaching strategies, they often avoided providing in-depth critiques of their methods, particularly when it involved acknowledging specific weaknesses or proposing significant changes, likely due to cultural factors such as *hiya* (modesty) and a preference for maintaining group harmony. This hesitancy aligns with the cultural values of *hiya* (modesty or shame) and the emphasis on SIR, which prioritize group harmony and indirect communication. These findings echo Elipane's (2011) observations on the interplay between cultural norms and reflective practices, suggesting that cultural sensitivities may limit the extent of self-analysis in LS settings.

All four participants highlighted growth in pedagogical understanding as a key outcome of their engagement in Lesson Study (LS). However, three participants expressed uncertainty or discomfort with self-critique during reflective discussions, underscoring cultural barriers to deeper self-analysis. Participants often framed their reflections in positive terms, focusing on successes rather than areas for improvement. This pattern aligns with the findings of Stigler and Hiebert (1999), who observed the influence of cultural norms on reflective practices, particularly the tendency to prioritize affirmation over critical self-examination.

To address these challenges and enhance the depth of teacher reflection, future LS adaptations could incorporate tools like anonymous self-assessments or structured written reflections. These approaches would allow teachers to critically analyze their teaching practices in a way

that minimizes the social pressures associated with face-to-face critique. Such strategies reflect the theoretical emphasis on creating a supportive yet challenging professional development environment, as emphasized by Saylor and Johnson (2014), and could help teachers engage more fully in the transformative potential of reflective practice.

### Challenges with Content Knowledge

The LS cycles illuminated challenges in teachers' content knowledge, particularly their tendency to rely on simplified examples to convey complex concepts. This aligns with the theoretical emphasis on the importance of subject matter expertise in professional development to foster conceptual understanding (Saylor & Johnson, 2014). For instance, Arlyne used pizza to explain fractions in a Grade 6 math lesson. Reflecting on her choice, she remarked, "*I used pizza as an example... I realize now it's limiting,*" demonstrating an awareness of its constraints but uncertainty about more robust alternatives. Similarly, Desiree's Science 8 lesson on "Work" introduced gravity and force but failed to connect these ideas to the scientific definition of "Work," revealing a gap between her examples and the theoretical depth required for effective instruction.

In Desiree's Science 8 lesson on "Work", she introduced concepts such as gravity, energy, force, and movement, reflecting the ideas students already associated with the topic. However, while these ideas were surfaced, they were not effectively reintegrated into the broader scientific definition of work. Specifically, Desiree struggled to emphasize the relationships between these concepts and the formula for work ( $\text{Work} = \text{Force} \times \text{Distance}$ ). This lack of focus on the underlying connections meant that students were left without a clear understanding of how these variables contribute to the concept of work in a scientific context.

Aian's reflections further highlighted this reliance on accessible techniques. He shared, "*I use role play in language teaching and competitions in mathematics classes,*" emphasizing approaches that engage students but lack explicit links to foundational principles. In a post-lesson discussion, Aian admitted, "*I feel the students expect it, and it's what works best,*" reflecting his preference for familiar, effective methods that prioritize immediate student comprehension over conceptual depth.

This reliance on simplified examples reflects cultural influences, particularly *pakikisama*, which emphasizes SIR and minimizing confusion. Observational data revealed that teachers frequently opted for relatable analogies to maintain harmony and avoid misunderstandings during classroom discussions. While these strategies supported student engagement, they often limited opportunities to introduce higher-order, abstract concepts, as seen in Desiree's deliberate simplification of gravity and force in her Science 8 lesson.

The analysis reinforced these observations, with all four participants demonstrating a preference for using accessible analogies, such as pizza or role-playing, during planning discussions to facilitate comprehension. However, three participants noted missed opportunities to engage students with more complex ideas during classroom observations. Additionally, content knowledge gaps were identified in feedback discussions by three participants, highlighting areas where theoretical understanding could be strengthened.

These findings underscore the need for professional development that integrates content knowledge enhancement with pedagogical skills, a core principle of effective LS (Lewis et al., 2009). By deepening teachers' subject matter expertise, professional development can

empower them to introduce higher-order concepts confidently, balancing simplicity with rigor. This approach aligns with Stigler and Hiebert's (1999) emphasis on the importance of pedagogical content knowledge in fostering critical thinking and deeper understanding. Strengthening content knowledge would enable teachers to move beyond familiar examples, enriching students' learning experiences and cultivating critical engagement with complex ideas.

### **Supportive Peer Relationships**

The collaborative environment inherent in LS played a crucial role in fostering supportive peer relationships, aligning with the theoretical emphasis on collaboration as a cornerstone of effective professional development (Saylor & Johnson, 2014). Teachers found value in the trust and mutual respect that developed through the LS process, enabling them to share their thoughts and challenges more openly. Leah reflected, "*I felt more comfortable sharing my struggles with them because I knew they wouldn't judge me,*" highlighting how these relationships encouraged candid engagement in the reflective process.

Observational data supported this by showing that teachers were more actively engaged and forthcoming in smaller, informal group settings. In these settings, they openly shared their teaching challenges, asked for advice, and reflected on their practices without displaying the hesitation or guardedness observed in larger, formal group discussions. For instance, during informal gatherings, teachers were observed laughing, using casual language, and providing mutual encouragement, which contrasted with the more restrained interactions in formal reflective sessions. These informal interactions mitigated cultural barriers, such as *hiya* (modesty or shame), which typically discourage open critique. This finding aligns with Elipane's (2011) insights on the importance of collegiality in overcoming cultural constraints to reflection and feedback. Structured trust-building exercises, such as peer reflection sessions, could further enhance these relationships, enabling teachers to engage in deeper and more constructive feedback within the LS framework.

Collegiality emerged as a distinct strength of LS, with all four participants emphasizing the importance of positive peer interactions. Trust and mutual support were consistently cited as critical enablers of their participation in LS. These relationships fostered a sense of belonging and played a pivotal role in mitigating the influence of cultural norms, such as prioritizing smooth interpersonal relationships over critique. This finding aligns with the work of Lewis et al. (2009), who highlight that collaboration in professional development contexts enhances teacher agency and creates an atmosphere conducive to meaningful reflection.

The supportive peer relationships cultivated through LS illustrate its potential to balance cultural sensitivity with the need for critical and constructive dialogue. By reinforcing these relationships through structured activities and fostering a culture of mutual trust, LS can provide a foundation for sustainable professional growth and improved instructional practices.

### **Implications for Practice**

The findings of this study underscore the need for tailored approaches to professional development models like Lesson Study (LS) within culturally nuanced and resource-constrained environments. While acknowledging the successes and challenges encountered during the implementation of LS, this section outlines broader strategies to address identified gaps and enhance the efficacy of LS in similar contexts.

### **Emphasizing Long-Term Capacity Building**

To ensure sustainability, schools and educational policymakers should prioritize long-term capacity building rather than short-term interventions. This entails training a core group of LS facilitators who are not only well-versed in the principles of LS but also skilled in navigating cultural sensitivities and bilingual dynamics. This cadre of facilitators can serve as local champions, fostering a culture of continuous improvement even after external support is withdrawn.

### **Leveraging Digital Tools for Inclusive Participation**

Integrating digital platforms and tools can help address logistical and linguistic challenges identified in this study. For instance, virtual reflective tools, such as digital forums or feedback apps, could facilitate asynchronous discussions, allowing teachers to articulate their thoughts more deliberately. These platforms can be designed to accommodate bilingual inputs, encouraging greater inclusivity and minimizing cognitive barriers associated with code-switching.

### **Creating Contextually Relevant Training Materials**

Educational institutions and policymakers should invest in the development of training materials that reflect local cultural and linguistic realities. For example, resources can include sample lesson plans and reflective prompts in both Filipino and English, incorporating culturally relevant examples that resonate with teachers' experiences and students' contexts. These materials should emphasize strategies for bridging the gap between simplified analogies and theoretical depth.

### **Encouraging a Research-Practice Nexus**

This study highlights the need for ongoing research to inform and refine LS practices. Schools and education departments could establish partnerships with universities and research institutions to create a feedback loop between practice and theory. These collaborations can yield actionable insights into adapting LS for various cultural settings while also contributing to the global discourse on professional development.

### **Promoting Adaptive Leadership in Schools**

School leaders play a pivotal role in the successful implementation of LS. Administrators should receive training in adaptive leadership, equipping them to balance cultural sensitivity with the need for fostering a reflective and open feedback culture. Leadership programs can focus on developing skills in managing group dynamics, supporting bilingual engagement, and addressing systemic constraints.

### **Scaling LS Through Peer Networks**

The collaborative nature of LS lends itself to scaling through peer-led networks. By establishing communities of practice that connect teachers across schools, educators can share strategies, challenges, and successes, fostering a collective commitment to professional growth. These networks can also serve as platforms for cross-cultural exchanges, enabling educators from diverse contexts to learn from each other's adaptations of LS.

### **Addressing Socio-Economic Constraints Through Strategic Partnerships**

Given the resource limitations in many low-SES schools, as observed in this study, strategic partnerships with NGOs, private sector organizations, and government agencies can provide critical support. These partnerships could supply resources such as instructional materials, training workshops, and access to digital tools, thereby alleviating the infrastructural and financial barriers to effective LS implementation.

### **Cultivating an Inclusive Feedback Culture**

The cultural preference for maintaining harmony, while valuable, necessitates a reimagining of feedback mechanisms. Introducing structured yet non-intimidating feedback processes—such as group-level critiques focusing on lesson objectives or anonymized written reflections—can foster a more inclusive environment for constructive critique. These adaptations should be framed as opportunities for mutual learning rather than personal judgment.

### **Limitations**

This study is not generalizable to other contexts due to its small sample size, qualitative design, and the highly specific setting of a single low SES private school in the Philippines. The inclusion of only four teachers makes it impossible to extrapolate the findings to all teachers within the studied institution, let alone to other institutions in the Philippines or similar international settings. This limitation is further compounded by the absence of replication, which would have otherwise strengthened the study's applicability beyond its immediate scope.

While the findings lack generalizability, there is potential transferability to other settings with similar cultural and socio-economic characteristics. The challenges identified in this study, particularly those related to implementing the LS model in a culturally nuanced environment, may resonate with low SES schools in the Philippines and possibly other cultures that exhibit comparable values, such as those prioritizing SIR. For instance, the reluctance to provide direct critique due to *hiya* and *pakikisama* can similarly manifest in other contexts where harmony and indirect communication are valued.

Another factor to consider is the potential influence of the researchers in the study. During the intervention, researchers facilitated early LS cycles, introduced reflective tools, and supported teacher collaboration. While this guidance was critical in initiating the LS process, the researchers' presence may have shaped teacher behaviors, language use, and group dynamics. For example, the bilingual nature of discussions, where teachers code-switched between Filipino and English, may have been influenced by the perceived need to align with the researchers' language expectations. Additionally, teachers may have moderated their reflections or critiques in deference to external facilitators, reflecting cultural tendencies toward deference to authority figures.

The hierarchical nature of Filipino cultural dynamics, such as teacher-student and peer-to-peer relationships, was not prominent in this small sample. However, this observation may have been influenced by the close-knit group dynamics or the researchers' facilitative role, which could have tempered hierarchical behaviors. Future studies should investigate how these dynamics might differ in fully teacher-led LS cycles or in larger groups with less external facilitation.

The bilingual nature of the setting also introduces a specific limitation. Teachers' preferences for using Filipino during reflections and alternating between English for formal discussions

highlight how linguistic comfort influences the depth of feedback and engagement. This dynamic, however, may have been further nuanced by the presence of researchers, which could have subtly influenced language preferences during discussions. Such factors constrain the findings' applicability to monolingual or differently bilingual contexts.

While this study provides valuable insights into how cultural, linguistic, and contextual factors shape LS implementation, these findings are contextualized within the particular challenges of a small-scale intervention. Broader and more diverse studies, including those with larger sample sizes, varied SES contexts, and longitudinal designs, are needed to establish more robust conclusions. Future research should also minimize researcher involvement to better understand the dynamics of fully teacher-led LS cycles and their sustainability in culturally diverse contexts.

## Implications for Future Research

This study highlights the need to adapt the LS model to the cultural and contextual realities of the Philippines, where values such as SIR and bilingual communication significantly shape teacher engagement. Future research should focus on scaling LS to diverse educational settings, including public schools, rural areas, and schools serving different socio-economic backgrounds. Expanding beyond the low SES private school examined here will provide broader insights into how cultural norms influence LS dynamics across varied contexts in the Philippines. Additionally, while this study's small sample did not reveal hierarchical barriers, research involving larger and more diverse teacher groups could explore how power dynamics, seniority, and hierarchical relationships affect the willingness to provide and receive critical feedback during LS cycles. Understanding these dynamics is essential for balancing cultural sensitivities with the reflective rigor required by LS practices.

The bilingual context observed in this study further underscores the importance of linguistic comfort in reflective discussions. Future studies could evaluate the impact of structured bilingual support—such as materials, prompts, and facilitation in both Filipino and English—on enhancing teacher engagement and the depth of reflection. Comparative research in multilingual and monolingual settings would clarify the broader implications of language in LS effectiveness. Another important direction is the integration of subject-matter-focused professional development into LS cycles. Findings from this study revealed gaps in teachers' content knowledge, as evidenced by their reliance on simplified examples. Future research could examine how targeted training on subject-specific pedagogy influences teachers' conceptual depth and instructional strategies within the LS framework.

Finally, a critical next step is to develop and test culturally responsive LS adaptations that respect Filipino values while fostering meaningful critique and reflection. Mechanisms such as anonymous feedback tools, structured reflective prompts, and trust-building activities could help teachers navigate cultural barriers like *hiya* and *pakikisama*. This research avenue aligns closely with the study's practical implications and can provide actionable frameworks for enhancing LS's relevance and effectiveness in culturally sensitive environments. By pursuing these directions, future work can ensure that LS remains a powerful and adaptable professional development model capable of addressing the unique challenges of diverse educational contexts.

## Conclusions

This study highlights the critical role of cultural and linguistic factors in the effective implementation of LS among mathematics and science teachers in a low SES school in the Philippines. Key findings reveal that Filipino cultural values—particularly *SIR*, *pakikisama* (harmony), and *hiya* (modesty)—can limit teachers' openness to direct critique, thereby impacting the reflective depth that LS requires. While LS fosters collegiality and trust, teachers' inclination to prioritize group harmony over critical feedback reflects deep-rooted social norms.

The study also underscores the significance of bilingualism in LS discussions. Teachers preferred using Filipino for nuanced reflections while switching to English for formal and technical content. This linguistic dynamic influenced their comfort and the spontaneity of their contributions, highlighting the need for bilingual resources and facilitation to support reflective depth.

Despite these cultural challenges, LS demonstrated its potential to foster professional growth by encouraging collaborative learning and self-reflection. Teachers reported improved pedagogical awareness but faced content knowledge gaps, relying on simplified examples for complex topics. Addressing these gaps through content-focused professional development could further enhance LS's impact.

To optimize LS in the Philippine context, culturally sensitive adaptations are essential. Structured feedback tools, bilingual support, and trust-building activities may help balance cultural values with the rigor of reflective practice. By addressing these barriers, LS can empower teachers in resource-constrained settings, offering a sustainable model for professional development and improved educational outcomes.

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## **Appendix 1 Study Context and Community Background**

This study was conducted in a small private school located in Antipolo City, Philippines, serving a predominantly low SES community. According to the Philippine Statistics Authority (PSA), the poverty incidence in Rizal Province, where Antipolo is situated, was approximately 7.2% as of the most recent survey, with localized disparities in urban and rural areas. However, the community served by the school experiences higher poverty levels, with over 30% of families reporting incomes below the official poverty threshold of PHP 12,030 per month for a family of five.

The school itself reflects these economic constraints. Tuition fees are kept deliberately low, averaging PHP 5,000–7,000 per year, to accommodate families with limited financial capacity. Despite this, many students benefit from financial aid or installment payment plans, indicating the economic challenges faced by the community. Furthermore, school facilities are minimal, with limited access to technology and laboratory resources, which aligns with the socio-economic profile of the population served.

These statistics and contextual details substantiate the characterization of the community as low SES and provide a clear basis for examining how socio-economic factors intersect with cultural and linguistic influences on the implementation of the LS framework.

## Appendix 2 Details of Data Collection

### *Focus Group Discussions (FGDs)*

FGDs were a key data collection method in this study, designed to explore teachers' experiences, expectations, and the cultural and linguistic insights that influenced their engagement with the LS framework. A total of five FGDs were conducted: one at the beginning of the study to establish baseline perceptions and four after each LS cycle to gather reflections on the process. Each session lasted approximately 60–90 minutes and was held in a private, quiet space at the school to ensure confidentiality and minimize distractions.

The questions for the FGDs were developed based on a combination of the study's research objectives, existing literature on LS and professional development, and cultural and linguistic considerations specific to the Philippine context. The goal was to elicit meaningful and focused discussions that would shed light on the following themes: teachers' perceptions of LS and their expectations before implementation, the influence of cultural values (e.g., *pakikisama* and *hiya*) on collaboration and feedback, the role of bilingualism in shaping communication and reflections during LS cycles; challenges and benefits experienced during the implementation of LS, suggestions for adapting LS to better align with the local context.

To ensure the questions were clear, relevant, and culturally appropriate, they were pre-tested with a small group of educators not involved in the study. Feedback from this pre-test was used to refine the questions further. The following is the final set of FGD questions used during the study:

#### *Baseline FGD (Pre-implementation):*

1. What are your initial thoughts on Lesson Study? Have you heard of or participated in similar professional development models?
2. What do you expect to gain from participating in this process?
3. How do you perceive collaboration and feedback in your current teaching practices?

#### *FGDs After Each LS Cycle:*

1. What were your experiences during this cycle of LS? Were there any challenges you encountered?
2. How did cultural values (e.g., *pakikisama*, *hiya*) influence your participation in planning and reflection sessions?
3. How did you navigate language use (Filipino and English) during discussions? Did it impact the depth of your reflections?
4. What strategies or practices during this cycle worked well? What could be improved for the next cycle?

#### *Final FGD (Post-implementation):*

1. Looking back at all the LS cycles, how would you describe the overall impact on your teaching practices?
2. How do you feel the cultural and linguistic aspects of your work environment influenced the LS process?
3. What recommendations would you provide for improving the implementation of LS in similar contexts?

Audio recordings and detailed notes were used to document the discussions, and participant consent for recording was obtained before each session. The structured but open-ended nature of the questions allowed for deep exploration of the study themes while encouraging participants to share their thoughts freely. These discussions provided rich qualitative data, forming a critical component of the study's findings.

### ***Classroom Observations***

Classroom observations were conducted to capture real-time teacher-student and teacher-peer interactions during Lesson Study (LS) cycles. A total of eight observations were carried out, with two observations per LS cycle. Each observation lasted approximately 45–60 minutes, corresponding to the length of the lessons being implemented. The observations were performed by researchers using a structured observational guide to ensure consistency and reliability in data collection. The following outlines the details of the observational guide:

1. *Teacher Practices and Pedagogical Strategies*
  - How does the teacher introduce and explain concepts?
  - What strategies are used to engage students (e.g., questioning, group activities)?
  - Are the lesson objectives clearly communicated and aligned with the activities?
2. *Student Engagement and Responses*
  - How actively are students participating in the lesson (e.g., asking questions, collaborating with peers)?
  - Do students appear to understand the concepts being taught (e.g., correct responses, active problem-solving)?
  - Are there any observable differences in engagement across different groups of students (e.g., gender, language proficiency)?
3. *Collaborative and Reflective Practices (Post-Observation Reflection)*
  - How do teachers interact with their peers during post-lesson reflections?
  - Are teachers able to provide and receive constructive feedback?
  - What cultural or linguistic factors (e.g., use of Filipino or English, influence of *pakikisama* or *hiya*) are evident during reflective discussions?

Researchers paid close attention to the following areas during observation: (1) the clarity of the teacher's explanations and the alignment between lesson plans and classroom implementation, (2) specific examples and analogies used by the teacher to explain concepts, noting any reliance on simplified examples, (3) instances of bilingual communication, including code-switching between Filipino and English, and its effect on both teaching and student understanding, (4) student reactions, including their engagement levels, verbal responses, and non-verbal cues like expressions or gestures, and (5) interaction dynamics during collaborative activities, such as group work or peer feedback sessions.

All observations were audio- and video-recorded to capture both verbal and non-verbal interactions comprehensively. Detailed field notes supplemented the recordings, focusing on elements such as teacher and student behavior, the physical classroom environment, and any notable disruptions or contextual factors. The observational guide was applied systematically to ensure consistency across all sessions.

These structured observations provided valuable insights into how teachers implemented LS, how students engaged with the lessons, and how cultural and linguistic factors influenced

classroom and post-lesson dynamics. The guide ensured that the data collected was both detailed and relevant, contributing significantly to the analysis and findings of the study.

### ***Individual Interviews***

Semi-structured interviews were conducted with each teacher at the end of every LS cycle to elicit personal reflections on their experiences and to delve deeper into themes that emerged during FGDs and observations. Each interview lasted 30–60 minutes and followed a guide designed to balance consistency with flexibility, allowing participants to elaborate on their perspectives. The interview questions focused on cultural and linguistic factors, collaborative dynamics, and the perceived impact of LS on their teaching practices. Researchers took measures to minimize bias by avoiding leading questions and maintaining a neutral tone. Additionally, cultural sensitivities, such as the influence of *hiya* (modesty) and *pakikisama* (harmony), were acknowledged, with participants reassured that their responses would remain confidential. All interviews were audio-recorded, and transcription was done verbatim to preserve the authenticity of responses.

### ***Lesson Artifacts and Reflective Documents***

Teachers' lesson plans, instructional materials, and student work samples were collected as part of the data set to provide additional insights into how the LS process influenced planning and instructional practices. These artifacts were analyzed in conjunction with other data sources to identify recurring themes related to professional growth and cultural considerations.

### Appendix 3 Details of Data Analysis

#### ***Coding Approach and Framework***

The data analysis utilized a combination of inductive and deductive coding, guided by the research questions and the theoretical framework of the study. Deductive codes were informed by established literature on LS and culturally responsive professional development, particularly the frameworks proposed by Lewis, Perry, and Hurd (2009) and Mukwambo et al. (2018). These codes included categories such as "collaboration," "reflective practice," and "feedback dynamics." Concurrently, inductive codes emerged during the analysis process, capturing themes unique to the Philippine context, such as "hesitancy in critique," "code-switching," and "SIR." The development and refinement of codes were systematically documented in a codebook, which provided detailed definitions, examples, and application rules to ensure consistency.

#### ***Data Management and Coding Tools***

All data, including transcripts of focus group discussions FGDs and interviews, as well as detailed observation notes, were managed and analyzed using Microsoft Excel. Although not a specialized qualitative analysis tool, Excel was selected for its accessibility and flexibility in organizing and categorizing qualitative data. Verbatim transcripts were uploaded, and audio and video recordings were reviewed to annotate verbal and non-verbal cues, such as tone, pauses, and gestures, which were critical for understanding the depth and context of participant interactions. Non-verbal observations were linked to the transcripts to provide richer insights into the data.

#### ***Inductive Coding Process***

The coding process involved three distinct stages: initial coding, axial coding, and selective coding. In the initial phase, transcripts and observation notes were reviewed line by line to identify preliminary codes. Deductive codes were applied to text segments aligning with theoretical constructs, while inductive codes emerged from patterns observed within the data. For instance, the code "hesitancy in critique" reflected the influence of cultural values, such as *hiya* and *pakikisama*, on teachers' willingness to engage in feedback. Verbal and non-verbal cues were coded separately, with annotations for behaviors such as gestures or expressions complementing verbal data.

During the axial coding phase, codes were grouped into broader categories based on observed relationships and patterns. For example, codes such as "*pakikisama*," "*hiya*," and "self-restraint" were grouped under the theme "Cultural Sensitivity in Feedback," which captured how cultural norms shaped teacher interactions. Similarly, "language preference," "code-switching," and "comfort with English" were consolidated under "Impact of Language on Communication." The refinement process ensured that emerging themes accurately reflected the data, with adjustments made iteratively to improve clarity and coherence.

In the final phase, selective coding focused on overarching themes central to the research questions, supported by representative codes. The frequency and distribution of these codes were analyzed across data sources, such as FGDs, interviews, and classroom observations, to identify commonalities and differences. For instance, the code "hesitancy in critique" appeared more frequently in FGDs (42 instances) compared to interviews (16 instances), highlighting group-level dynamics that influenced reflective practices.

Table 3.1 summarizes the key themes, their descriptions, and examples of codes, with excerpts from the data sources to illustrate their application. The table also specifies whether the data came from FGDs, interviews, or observations, providing transparency and clarity.

**Table 3.1 Overview of the key themes**

| Theme                                  | Description  | Codes  | Example Excerpts  | Source           |
|--|--|--|---|------------------|
| Cultural Sensitivity in Feedback       | How cultural values, such as <i>pakikisama</i> and <i>hiya</i> , influence teachers' comfort and willingness to engage in critical discussions and provide feedback. | <i>Pakikisama, Hiya, Self-restraint, Avoiding conflict</i>       | <i>"I didn't want to say too much about her lesson because it might sound too critical."</i>                                    | FGDs, Interviews |
| Impact of Language on Communication    | The role of bilingualism and language preference in shaping teachers' comfort and depth of engagement in LS discussions.   | Language preference, Comfort with English, Code-switching        | <i>"I felt I could express myself better in Filipino, especially during feedback."</i>  | FGDs, Interviews |
| Professional Growth through Reflection | Teachers' reflections on how LS has contributed to their development in terms of pedagogical knowledge and collaborative learning.                                   | Self-reflection, Pedagogical insights, Growth in teaching        | <i>"I learned to think more about why I choose certain activities, not just what's easy."</i>                                   | Interviews       |
| Challenges with Content Knowledge      | Teachers' difficulties in articulating theoretical principles and demonstrating deep content knowledge during lesson planning and reflection.                        | Content knowledge gaps, Simplified examples, Theoretical clarity | <i>"I used pizza as an example for fractions, but I realize now it's limiting; I'm not sure what else I could use, though."</i> | Observations     |
| Supportive Peer Relationships          | The role of mutual respect, trust, and collegial support among teachers, enabling a collaborative atmosphere for LS despite cultural constraints.                    | Trust-building, Collegiality, Mutual support                     | <i>"I felt more comfortable sharing my struggles with them because I knew they wouldn't judge me."</i>                          | FGDs, Interviews |

### ***Inter-Rater Reliability***

To ensure reliability, three researchers (the two authors plus an independent coder) independently coded 20% of the data and compared results before coding the rest of the data. Discrepancies were discussed collaboratively, refining code definitions and applications. Inter-rater reliability was calculated using Cohen's kappa, with an average score of 0.82, indicating substantial agreement and ensuring consistency in the analysis (McHugh, 2012).

### ***Code Frequencies and Distribution***

The frequency and distribution of codes across FGDs, interviews, and observations were calculated to identify patterns. For example, "Cultural Sensitivity in Feedback" was observed most frequently in FGDs, reflecting group-level dynamics, while "Professional Growth through Reflection" appeared more prominently in individual interviews. These frequencies were also analyzed by teacher, discipline, and LS cycle to explore variations across different contexts, offering a nuanced understanding of how cultural and linguistic factors influenced LS implementation.