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Article

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Abstract: Teacher self-efficacy (TSE) significantly influences teacher well-being and pedagogical quality, thereby impacting student learning outcomes. Despite the recognized effectiveness of Lesson Study (LS) in shaping teachers' practices and beliefs, there is a research gap in TSE, particularly in higher education. To address this, we conducted a longitudinal study at a northeastern Chinese university, tracking TSE evolution in three English as a Foreign Language (EFL) teachers, encompassing both novices and experienced educators, during a six-month LS program. We collected both quantitative and qualitative data, encompassing interviews, surveys, and observations. Underpinned by Bandura and Wyatt's self-efficacy theory, the impact of LS on teachers' TSE development was explored and interpreted. Our findings shed light on the many ways in which LS effects individual teachers' TSE. Notably, both novice and experienced teachers improved significantly in TSE, especially in the domains of *instructional techniques* and *student engagement*. However, in the context of *classroom management*, there was considerably less growth. Furthermore, our research identifies a number of challenges that can have a negative impact on teachers' TSE, such as adapting to students' changing needs, dealing with limited resources, managing time constraints, navigating the school examination system, and overcoming initial resistance to the LS approach.

Keywords: teacher self-efficacy; lesson study; higher education; professional development

1. Introduction

Numerous studies in teacher education stress the value of collaborative learning for teacher professional development (e.g.,Puchner & Taylor, 2006; Raymond & Gabriel, 2023; Zonoubi et al., 2017). Lesson Study (LS) is a tool that promotes teacher collaborative learning, emphasizing practices like planning, observation, and lesson reflection(e.g., Lewis et al., 2012; Schipper et al., 2017; Takahashi & McDougal, 2016).

However, existing research has predominantly focused on LS's impact on teaching ability in primary and secondary schools, with limited attention to teacher self-efficacy (TSE), especially among higher education instructors. TSE refers to "teachers' beliefs in their abilities to support learning in various tasks and context-specific cognitive, metacognitive , affective and social ways" (Wyatt, 2016, p.603), which consistently links to classroom quality, student outcomes, and teacher well-being (for a review, see Klassen & Tze, 2014). Furthermore, there are no studies employing a longitudinal qualitative approach to explore the development of TSE among higher education teachers in the Chinese context.

To address this gap, our study aims to investigate how LS's collaborative learning process supports TSE among higher education teachers. We conducted a longitudinal study tracking TSE change in three English teachers from one Chinese university throughout their six-month engagement in the LS cycle.

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1.1. Literature Review

Higher education English language teaching in China

The evolution of English language teaching (ELT) in China, influenced by political, economic, social, and educational needs (Gu, 2002), experienced a pivotal moment with the initiation of the Open Door Policy in 1978 (Gu, 2002). The Chinese government, recognizing the importance of English for global engagement and modernization, prompted significant demand among learners for diverse opportunities like university admission, studying abroad, job acquisition (especially in international companies), and career advancement (Fan, 2009; Liu et al., 2016; Pan & Block, 2011).

This high demand has led to substantial commitment from various stakeholders, including the government, teachers, students, parents, and society. Acknowledging the language's value, the Chinese Ministry of Education has introduced English curriculum standards for higher education, aligning with student-centered, task-based, and communicative instruction advocated by the recent reform influenced by the English Curriculum Standards for Compulsory Education (2011 version) (Liu et al., 2016).

However, this educational reform poses challenges for English teachers, impacting their self-efficacy and necessitating changes in knowledge, skills, and teaching methods, consequently influencing their beliefs about English teaching (Chong & Kong, 2012).

Teacher Self-Efficacy (TSE)

TSE research traces its roots to self-efficacy theory, a key element of Bandura's Social Cognitive theory (1997). Self-efficacy, defined as the belief in one's ability to successfully execute a behavior to achieve a specific goal, profoundly influences behavior, thoughts, feelings, and motivation (Bandura, 1977, 1986, 1997), impacting decision-making and perseverance in the face of challenges (Zee & Koomen, 2016).

In the teaching context, TSE is defined diversely by researchers. For example, Armor (1976) considers it in terms of learning outcomes, reflecting teachers' confidence in influencing students' learning performance. Tschannen-Moran, Woolfolk Hoy, and Hoy (1998) define TSE in relation to teaching methods, as the belief in the capability to organize and execute actions required for successful teaching tasks in a specific context. Wyatt (2016) broadens the scope to include teachers' beliefs in supporting learning through cognitive, metacognitive, affective, and social approaches.

Bandura (1997) posited that self-efficacy beliefs stem from four sources: mastery experience, vicarious experience, verbal persuasion, and physiological arousal/affective states. These encompass teachers' teaching experiences, observations of others, feedback from colleagues, and emotional states during teaching events. Understanding how information from these sources shapes TSE beliefs supports the development of positive TSE beliefs (e.g., Malinen et al., 2013; Raymond & Gabriel, 2023; Zonoubi et al., 2017). Models like Tschannen-Moran, Woolfolk Hoy, and Hoy's (1998) Multidimensional Model of Teacher Efficacy and Wyatt's (2016) Growth in Language Teachers' Self-Efficacy Beliefs model contribute to TSE research.

In mainstream teacher education literature, TSE links to effective classroom management (Hicks, 2012), willingness to adopt innovation (Zonoubi et al.,2017), effort invested in teaching (Wyatt, 2010), and goals set by teachers. It also relates to how teachers handle student errors and motivation (Puchner & Taylor, 2006; Shahzad & Naureen, 2017). Empirical research on TSE in ELT includes correlational and intervention studies.

Correlational studies show a positive relationship between TSE and factors like emotional intelligence (Lee & van Vlack, 2018), language proficiency (Zonoubi et al., 2017), motivation to implement teaching strategies (Demir et al., 2015), and the adoption of reflective teaching approaches (Babaei & Abednia, 2016). Intervention studies suggest that teacher education programs and positive teaching experiences enhance self-efficacy, while initial challenges may have the opposite effect (Atay, 2007). Collaborative activities, engagement in action research, and improved pedagogical knowledge contribute to TSE development (Pan & Block, 2011; Raymond & Gabriel, 2023).

Despite this research, studies have mainly focused on elementary and secondary EFL teachers. Chinese college EFL teachers express a lack of confidence in curriculum reforms promoting student-

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centered approaches. In response, collaborative learning approaches like LS are seen as potential solutions (Puchner & Taylor, 2006; Ylonen & Norwich, 2015).

Lesson study

LS , widely embraced globally (Huang et al., 2017), originates from Japan and involves collaborative efforts among teachers and educators to enhance classroom practices. Through planning, observation, and reflective analysis of lesson design and delivery, LS aims to improve instruction quality, ultimately enhancing student learning outcomes (Huang et al., 2017). Recognized as a deliberate practice, LS effectively bridges theory and practice for teacher professional development and has demonstrated effectiveness in various regions worldwide (Lewis et al., 2012; Schipper et al., 2017; Norwich & Ylonen, 2015).

Extensive research on LS reveals its positive impact on teacher knowledge, skills, attitudes, and instructional practices. Participation in LS has been associated with increased teacher knowledge and skills (Dudley, 2011; Lewis et al., 2012; Takahashi & McDougal, 2016; Vrikki et al., 2017), shifts in attitudes and beliefs (Puchner & Taylor, 2006; Schipper et al., 2017; Li et al., 2023), leading to changes in instructional practices (Lewis et al., 2012; Ni Shuilleabhain & Seery, 2018; Huang et al., 2017).

The cyclical nature of LS, wherein stronger self-efficacy beliefs drive greater efforts, resulting in improved performances and forming a basis for higher efficacy evaluations, contributes to its popularity (Malinen et al., 2013, p. 35).

However, a noticeable research gap exists in LS studies, particularly regarding its influence on teachers' self-efficacy beliefs, a gap that becomes more pronounced when considering EFL teachers in higher education.

1.2. Research Question

Therefore, it is crucial to examine the formation and evolution of EFL teachers' TSE within LS cycles. To meet this requirement, we adopt a longitudinal qualitative approach to analyze the transformations observed in three EFL teachers and identify the factors influencing these changes. Our investigation is guided by the following research questions:

RQ1: How does LS impact the TSE beliefs and practical knowledge of foreign language teachers before and after LS instruction?

RQ2: Which specific elements within the LS process lead to changes in TSE related to practical knowledge?

RQ3: What are the challenges that teachers encounter during LS that have an impact on their TSE?

These research questions form the basis of our study, enabling an examination of the complex link between LS and EFL teachers' self-efficacy beliefs, as well as providing insights into the challenges they encounter in this context.

2. Materials and Methods

2.1. Research Context

In the second semester of 2023-2024, we purposefully selected four voluntary English teachers from a northeastern Chinese university for a six-month LS cycle. Their diverse educational backgrounds and teaching experiences informed the selection, as detailed in Table 1. After initial training, these teachers formed an LS team. Cathy, a seasoned teacher with 30 years of experience and a Ph.D., led the team as both the team leader and "knowledgeable other" (Fujii, 2019). The other three teachers, teaching the same content under Cathy's guidance, actively participated in LS cycles, covering research theme development, planning, teaching, observation, and reflection, following Lewis et al.'s (2009) framework.

The first author served as a participant-researcher, recording and joining teacher LS planning and reflection meetings, and regularly attending research lessons. Except for Cathy, who provided suggestions without teaching, each participant represented an individual case. However, collectively,

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the three teachers were treated as a multiple case study (Stake, 1978). This design facilitated in-depth descriptive explanations and interpretations of their TSE, offering a comprehensive understanding of the unique characteristics of each participant.

2.2. Data Collection

To address our research questions, we adopted a mixed-methods approach, gathering qualitative and quantitative data. For teachers' TSE assessment, we used Tschannen-Moran and Hoy's (2001) long-form Teachers' Sense of Efficacy Scale (TSES) before and after LS participation. The TSES, with 24 questions employing a five-point Likert format, assesses efficacy in *instructional strategies*, *classroom management*, and *student engagement*.

Qualitative data were collected through teachers' reflection logs post-discussion meetings, as well as video-recorded individual semi-structured interviews (approximately 45 minutes) at the project's conclusion. The interview protocol, based on Chong and Kong's (2012) work focusing on teachers' TSE development and learning points, guided the interviews. Supplementary materials, including research lesson videos, plans, field notes, and teaching materials, were collected to inform the semi-structured interview process and triangulate the data.

2.3. Data Analysis

We adopted different methods for analyzing different data types. For the TSES questionnaire, we conducted simple descriptive analysis, comparing pre- and post-test results for the three participants.

We employed a qualitative data analysis approach that combined both inductive and deductive methods, incorporating theoretically guided coding (King, 2004). After reviewing the transcripts, emerging ideas and concepts were examined through the lens of Social Cognitive Theory (Bandura, 1997). Our analysis focused on the participants' statements concerning their TSE, and the factors influencing their TSE.

In further refining our analysis, we utilized initial memos to cultivate more specific themes pertaining to TSE. We applied topic codes to uncover both shared patterns and distinctions across the cases (Creswell, 2007). Furthermore, we incorporated heuristic and interpretable coding, making use of established literature to inform and guide the analytical process (Creswell, 2007). Table 2 presents the predetermined codes.

2.4. Validity and Reliability

To enhance the validity of our qualitative study, we utilized data triangulation from multiple sources. Analysis involved two independent coders, achieving a strong reliability level of approximately 85% joint probability of agreement, well within the recommended range of 75% to 90% (Hattmann, 1977). This approach facilitated a comprehensive exploration of research questions, combining both quantitative and qualitative data to establish a robust foundation for our findings.

2.5. Ethical Considerations

Ethics approval was granted for study and participation was voluntary and participants were free to withdraw from the study without prejudice. Participants' identities were assigned pseudonyms to protect their privacy.

3. Results

This section presents the evolution of novice and experienced teachers' TSE and examines the factors within LS that they attribute to their TSE development.

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3.1. Change in Teachers' TSE

RQ1: How does LS impact the TSE beliefs and practical knowledge of the teachers before and after LS instruction?

To address this research question, we began by presenting the pre- and post-test results of each individual teacher's TSES scores to provide an overview of their TSE changes (refer to Table 3). To delve deeper into how TSE evolved in the domains of *student engagement*, *instructional strategies*, and *classroom management*, we scrutinized the qualitative data that either substantiated or contradicted these changes within these specific areas. The findings for each individual teacher are subsequently presented individually.

3.1.1. John

John, a male teacher with 23 years of teaching experience in the mid-to-late stage of his career and holding a master's degree, reported an overall increase in his TSE after a 6-month LS program, rising from 80 to 85 on the TSES. However, this increase was not uniform across all domains. *Student engagement* increased from 25 to 29, *instructional strategies* increased from 25 to 27, and *classroom management* remained at 30. Notably, there were varying degrees of change in *student engagement* and *instructional strategies*, with no changes observed in *classroom management*. To investigate these nuanced changes, qualitative data from teacher interviews and peer evaluations were analyzed to explore specific developments in these three key areas.

Student Engagement

John's confidence in the domain of *student engagement* increased significantly because of his acceptance of a collaborator's suggestion. He initiated the use of questionnaires to gauge his students' interests, tailoring his teaching tasks accordingly. This approach resulted in a more engaging and interactive learning environment, leading to positive classroom outcomes. The success of this method fueled his enthusiasm to introduce additional topics in the future, aiming to further capture students' interest. In his own words:

> "During the LS, I began to get accustomed to using questionnaires to survey students' interests and then designing teaching tasks based on their interests. Now, the classroom outcomes are very positive, with highly engaged students, so I hope to introduce more topics that pique the students' interest in the future."

John's innovative approach reflects his confidence in continually improving his teaching methods and positively impacting *student engagement*. This progression underscores his growing sense of self-efficacy as a teacher.

Instructional Strategies:

John's self-efficacy in *instructional strategies* experienced substantial growth as he embraced educational innovation, incorporating technologies like interactive gaming to enhance his classroom. This proactive approach earned praise from his colleague, Susan:

> "John is someone who eagerly explores new technologies and consistently employs innovative methods in his teaching. For instance, he recently introduced interactive gaming technology to his students, resulting in a notably positive and engaging classroom interaction."

Additionally, John acquired Pedagogical Content Knowledge (PCK) in setting instructional objectives through LS, previously unfamiliar to him. In his words:

> "I believe the most significant takeaway from the LS process is my newfound ability to establish clear teaching objectives and design teaching tasks aligned with those objectives. I previously lacked the knowledge and skills to set effective teaching goals."

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These accomplishments demonstrate his increasing self-efficacy in instructional strategies, reflecting his proactive approach to innovation and the development of pedagogical expertise.

Classroom Management:

John implemented two *classroom management* strategies: assigning fixed seats at the beginning of the school year and requiring students to prepare answers in advance. Team leader Cathy appreciated the effectiveness of seating assignments but expressed reservations about the second strategy, labeling it as "overly preparing." She questioned whether John's use of this strategy stemmed from a fear of losing control in the classroom or doubts about the students' abilities. In her words:

> "John's class is meticulously prepared, including assigning fixed seats at the beginning of the school year, which is a good classroom management strategy. However, he seems to overly prepare, as he requires students to prepare answers in advance. This raises questions about whether he fears losing control in the classroom or doubts the students' abilities."

While John's use of certain *classroom management* strategies is positive, the inclination towards excessive preparation and control may suggest doubts or fears regarding *classroom management*, indicating potential gaps in his confidence in his self-efficacy as a classroom manager.

3.1.2. Susan

Susan, a mid-career female teacher with 16 years of experience and a master's degree, experienced an increase in her overall TSE score from 82 to 85. Notably, this increase was most prominent in the domain of *student engagement*, rising from 27 to 29. In the domain of *instructional strategies*, there was an increase from 25 to 27. However, in *classroom management*, her score slightly decreased from 30 to 29. Overall, the data indicates an improvement in Susan's self-efficacy, particularly in *student engagement*, with stability in *instructional strategies* and a minor decline in *classroom management*. More nuanced changes in these domains are explored below:

Student engagement

Susan's self-efficacy in *student engagement* has shown significant growth, transitioning from a conservative teaching style predominantly based on lecturing to an interactive approach using questions as a scaffolding tool. This shift in her teaching style was recognized by Cathy, who stated:

> "Susan used to be quite conservative in her teaching. Her classroom was primarily lecture-based. However, it now appears that she consistently asks students questions, providing them with opportunities to answer."

This quote highlights Susan's evolution from a lecture-centered approach to one that actively engages students through questioning, indicating an increase in her self-efficacy as a teacher in terms of *student engagement*. She seems more confident in her ability to actively involve and interact with her students during lessons.

Instructional strategies

In the *instructional strategies* domain, Susan's self-efficacy underwent significant changes. She embraced cooperative learning methods and incorporated modern teaching technology into her practices. Initially skeptical about collaborative learning, Susan observed improved outcomes by implementing strategies like task allocation, gradually incorporating group learning into her teaching, as noted by Emma's evaluation:

> "…I noticed that her classroom started to incorporate the group collaborative teaching strategies we discussed last time, and she consistently pays attention to student feedback in class. However, in the past, when we suggested using group collaboration, she felt that most students were unwilling to participate."

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Furthermore, Susan overcame skepticism about mastering modern technology through learning with John. She adapted and integrated educational tools, boosting her confidence in technology, as expressed:

> "…I discovered that each team member had their own expertise, and we could learn from each other. For example, I learned from John how to integrate modern technology into teaching. I had never imagined I could learn it, but now it doesn't seem so difficult… I'm willing to invest more effort."

This showcases how successful implementation of new teaching strategies transformed Susan's doubt and skepticism into confidence and a greater commitment to improving her teaching practices.

Classroom management

Susan faces significant challenges in *classroom management* and student attendance, despite attempting various strategies like reward and punishment systems and clear rules suggested by other teachers. However, she hasn't seen notable improvements, leaving her somewhat hopeless. She describes the challenges:

> "Even when classroom rules are established, they don't seem to care much, and sometimes, I'm not sure how to effectively manage the class. This can be confusing at times. I've also been trying the classroom management methods of other teachers, but they haven't proven to be very effective either."

Susan further elaborates on the challenges by comparing the capabilities of her current students with those she taught before, highlighting a difference in English proficiency levels and attendance:

> "The students I previously taught had a very high level of English proficiency, excellent attendance, and active class participation. However, I've observed that the students I'm currently teaching have lower English proficiency levels and irregular attendance."

These quotes reveal that despite Susan's efforts to improve *classroom management* during the LS process, differences in students' English backgrounds make her feel passive about *classroom management*.

Overall, Susan's TSE exhibited positive changes in *student engagement* and *instructional strategies*, reflecting her adaptability and growth as a teacher. Nevertheless, challenges in *classroom management*, influenced by contextual factors, negatively impacted her self-efficacy in this domain. These nuanced changes underscore the complexity of a teacher's self-efficacy development and the significant influence of contextual factors on their perceived effectiveness in the classroom.

3.1.3. Emma

Emma, a female teacher with a doctoral degree and 1 year of teaching experience, demonstrated improved self-efficacy in *student engagement*, *instructional strategies*, while there are no changes to *classroom management*. Her overall TSE scores increased from 72 to 76, with *student engagement* rising from 25 to 28, *instructional strategies* edging up from 23 to 24, and *classroom management* consistently at 24. These changes reflected her growing confidence in various domains, aimed at enhancing the overall quality of her teaching.

Student engagement

Emma, a novice teacher, initially struggled with her confidence in interacting with students and fostering *student engagement* in her classroom. She openly shared her early teaching experiences, acknowledging, "When I first began my teaching career, I experienced significant anxiety when working with students. I lacked the knowledge of how to effectively engage them."

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Despite her limited teaching experience, Emma had a valuable advantage over her peers: her academic background, which focused on Task-based learning (Fan, 2009) and the communicative approach (Demir et al., 2015). Both approaches prioritize active *student engagement* in meaningful tasks and authentic communication. In these methodologies, students are given tasks that require them to use the target language practically and authentically. These tasks often involve problem-solving activities, discussions, or projects that encourage students to interact, collaborate, and communicate effectively. The core emphasis is on the process of learning through active engagement rather than mere content delivery.

Emma actively collaborated with two fellow teachers, closely observing their interactions with students, and gaining valuable insights from these teaching models (Bandura, 1997). Her academic foundation, combined with practical exposure, empowered her to develop and refine her distinctive teaching style. Susan recognized this transformation and remarked:

> "Emma's research background is a substantial asset. Through her active collaboration with other teachers and observations in John's classroom, she gradually adapted to the classroom environment. She made notable improvements and refined her teaching methods, particularly in areas like Task-based learning and the communicative approach, where both John and I had limited expertise."

Emma's positive evaluation underscores how her educational background and vicarious experiences, despite her novice status as a teacher, have significantly boosted her TSE, particularly in the domain of *student engagement*.

Instructional Strategies

Emma's TSE has transformed from being cautious and afraid of losing control to becoming more confident and willing to experiment. Initially, she was cautious about interacting with students and hesitant to give them too much autonomy, as she feared losing control in the classroom. However, she gradually adjusted her instruction strategies after receiving feedback from other teachers by providing more opportunities for student discussions and group activities based on advice from other teachers. As she said:

> "I used to hesitate to give students more autonomy in class, fearing a loss of control. Now, I'm more confident and open to trying different teaching strategies, like providing more opportunities for discussions and group activities."

In addition, she also became more daring in using English as the primary language of instruction, despite initial concerns about student comprehension. As she said:

> "...during lectures, even though other teachers advised me to teach in English, I still wasn't confident in conducting the entire class in English. However, now I try to speak English as much as possible…, but still worried about…"

Nevertheless, collaborative teacher's evaluations indicate the need for further enhancement, especially concerning the complete adoption of English as the instructional language, as John recommended: "If she uses more English in the classroom, the learning outcomes will improve."

It was revealed that Emma's journey in enhancing her TSE continues, with a focus on refining her language instruction techniques for the benefit of her students.

Classroom Management

Emma's approach to *classroom management* has evolved over time, beginning with the implementation of strict rules and progressing towards addressing challenges while exploring more effective methods. This transformation was clearly reflected in her statement:

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"My initial struggles with classroom management became evident when I tried to enforce a rule that required students to sit in the front row. Unfortunately, I encountered resistance from the students, which prompted me to abandon this approach in the hope of discovering more effective management strategies."

Despite the initial challenges she faced in classroom management, her proactive response in seeking improvement and adapting her methods demonstrates a positive attitude when confronted with obstacles.

In summary, Emma's TSE in *student engagement*, *instructional strategies*, and *classroom management* appears to have transitioned from an initial lack of confidence to an active pursuit of change and adaptation. While uncertainties may still exist, her optimistic mindset and willingness to experiment with new strategies are likely to contribute to the enhancement of her self-efficacy in these areas.

3.2. Contributing Factors of LS

RQ2: Which specific elements within the LS process lead to changes in TSE related to practical knowledge?

To answer our research question, we examined teachers' semi-structured interviews and reflection logs, specifically focusing on how LS contributes to their growth in TSE. The findings and supporting evidence from individual teachers are presented below.

3.2.1. John: Collaborative Reflection and Feedback

An analysis of John's reflection log and post-interview indicated that verbal persuasion played a crucial role in shaping his TSE during participating in LS. More precisely, the collaborative reflection and feedback received during the post-discussion meetings emerged as the primary mechanisms responsible for this enhancement of self-efficacy. Within these discussions, John's collaborative teachers offered observational and constructive feedback based on their observations of students learning, rather than his teaching behaviors. Such feedback encouraged him to think critically about how to improve lesson plan in the manner that facilitate student learning capability.

"What stood out the most to me throughout the process were the suggestions made by the other two teachers and the feedback on students' classroom engagement. Previously, I had focused solely on improving my teaching practices, frequently ignoring how these changes might affect the students. Now, thanks to the feedback from my colleagues, I know which teaching methods work and which do not. This, in turn, allows me to create more effective teaching activities."

Moreover, He also expressed that the feedback that does not intend to judge teachers' teaching performance made him feel unthreatened. As he said,

"Typically, feedback based on students' learning performance is more objective. However, feedback on a teacher's classroom teaching behavior may be perceived as an evaluation of the teacher, which causes me to become more anxious and defensive."

The above content highlights how collaborative reflection and feedback, focused on student learning and devoid of judgment, positively influenced John's teaching self-efficacy, fostering a more student-centered and effective approach to teaching.

3.2.2. Susan：Teaching and Observing

Susan, initially a teacher with a more traditional teaching style and limited proficiency in modern technology, experienced a significant boost in her TSE during her engagement in LS. Two primary sources contributed to this enhancement during the observation and teaching phases of LS: vicarious and mastery experiences.

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Her vicarious experience came from observing her collaborator, John, who effectively employed various interactive multimedia presentations, online resources, and technology-assisted tools to engage students in his lessons. Witnessing John's success challenged Susan's perceptions of technology's role in English language teaching. Her initial skepticism was replaced with a newfound appreciation for technology's impact on student engagement. As she reflected:

> "Previously, I felt I lacked the ability to apply technology in teaching. After all, my background is in English. I also believed that not using technology in the classroom wouldn't impact students' English learning. However, after observing Teacher John's class, I realized that incorporating technology into classroom teaching significantly increased student participation and their level of engagement."

This transformation prompted Susan to acquire proficiency in these new educational technologies and actively integrate them into her teaching practice. She stated: "I started to believe that I am able to operate technology, and I am also willing to integrate it into my instructional practice."

Her journey from skepticism to confidence in using technology to enhance *student engagement* highlights the impact of LS on Susan's self-efficacy and instructional practices. Her increased confidence in adapting and integrating technology into her teaching methods is a crucial aspect of her TSE growth, reflecting the positive influence of vicarious and mastery experiences within the LS framework.

3.2.3. Emma：Collaborative Planning

Data analysis reveals that Emma's TSE, as a novice in LS, is primarily influenced by her physiological state and mastery experience. She often felt anxious due to their inexperience and concerns about classroom management, student behavior, and evaluations. It was evident in her interview:

> “I lack teaching experience, and there are numerous uncontrollable factors in the classroom. Even with thorough lesson planning, problems may still arise, which makes me anxious. Especially in the classroom, when I try to arrange seats for students, they might not follow, which leaves me struggling with classroom management. Additionally, due to the school's teacher evaluations, I also fear the pressure of receiving negative feedback."

This kind of physiological state have negatively impacted her TSE. However, during LS, collaborating with experienced teachers in planning lessons, they effectively anticipated classroom uncertainties, reducing her stress. Concurrently, she successfully designed and delivered lessons, boosting her confidence and self-efficacy. As she acknowledges the role of LS:

> “Teachers typically collaborate in lesson studies, sharing their experiences and resources. This collaborative environment reduces my anxiety by alleviating my sense of isolation by providing me with support and a sense of belonging. Furthermore, I can discuss the problems I encounter in each class with other teachers, come up with new solutions, and successfully implement them in the classroom, gradually increasing my confidence.”

This transformation highlights the valuable role of LS in providing a supportive and collaborative environment for teachers, helping them address their anxieties and steadily enhance their self-efficacy.

Overall, our investigation into the impact of LS on TSE unveiled a fascinating journey of transformation for the teachers involved. Each of the three teachers, John, Susan, and Emma, encountered distinct challenges and sources of growth during their participation in the LS.

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3.3. Challenges Faced by the Teachers

RQ3: What are the challenges that teachers encounter that impact teachers' TSE during LS?

The analysis results of the challenges that the teachers face in LS can be categorized into *classroom management*, *cultural and contextual factors*, *initial resistance*, *time and resource constraints*, *school examination system*. These challenges possibly impact teachers' TSE.

3.3.1. Classroom Management

All the participating teachers struggled to maintain discipline and order in the classroom, which gave them the impression that they lacked control. This sense of diminished control can lead to feelings of inefficacy, as they doubted their ability to manage the classroom. Susan, for example, stated:

> "The biggest challenge for me is how to effectively manage the class. Even though our teaching activities are well-designed, some students continue to do their own thing in class, not participating in the activities. This type of student behavior occasionally dampens my enthusiasm."

Emma expressed the same sentiment, explaining that the main reason they felt ineffective was because higher education emphasized academic freedom, making them hesitant to impose strict discipline or control. As she explained:

> "Students in my class always prefer to sit in the back row," she explained. I request that they sit in the front row, but they refuse. I can't be too forceful in college because there's a strong emphasis on student autonomy and choice. This makes me feel incredibly passive."

It demonstrates how long-term difficulties in classroom management can lead to frustration and burnout. Teachers may feel exhausted and demotivated, which can undermine their self-efficacy even further. They may wonder if they have the stamina and ability to maintain an effective classroom environment.

3.3.2. Student Dynamics

All participant teachers found student dynamics to be a challenging factor that affected their ability to manage the classroom effectively. This included the diversity of student needs and abilities, peer influence, and the student support system.

In terms of diversity in student needs and abilities, the main concern was how to customize instruction to accommodate different learning styles and abilities. For example, Susan mentioned: "students from various majors had varying English proficiency levels. While some students needed extra support due to weaker English skills, meeting their needs could potentially take time away from students with stronger English skills. This balance was a challenge for me."

Peer influence was another issue, with students from diverse majors sometimes hesitating to interact, which hindered the implementation of communicative teaching. Emma noted that: "unfamiliarity among students from different majors resulted in a reluctance to participate in class, impacting the effectiveness of communicative teaching".

Regarding the student support system, teachers agreed that accommodating students' diverse learning needs for future development was challenging. John provided examples of students with specific goals such as "preparing for IELTS, TOEFL, or CET exams, and teachers had to tailor the class to meet these goals".

The challenges related to student diversity, peer influence, and accommodating students' diverse needs and goals can affect a teacher's self-efficacy by creating doubts about their ability to address these complexities effectively. This, in turn, can influence their overall confidence in their teaching abilities.

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3.3.3. Initial Resistance

When the concept of LS was introduced, Susan exhibited initial resistance. This is because, as experienced teachers, she has established teaching routines and methods that she felt comfortable with. The prospect of adopting new strategies and having her teaching practices scrutinized in LS was unsettling. It was evident in her quote: "At the beginning, I was quite resistant to LS because it requires teachers to change our teaching methods, use new teaching approaches in class, and have everyone observe." This fear of stepping out of her comfort zone may negatively impact her self-efficacy.

In addition, John also doubted about the effectiveness of LS. He questioned: "whether the time and effort invested in LS will yield tangible improvements in student learning or their own teaching capabilities". This skepticism can create a sense of self-doubt and influence his self-efficacy.

3.3.4. Time and Resource Constraints

Teachers also face challenges related to time and resources. For time constraints, they must balance their workload and personal life, as LS requires coordinating schedules for lesson planning, teaching, observation, reflection, and post-discussion among all participants. This must be managed alongside household and research, making the balance challenging. As Suan said:"LS requires teachers to collectively design lessons, teach, and reflect. This means we need to carve out time to do these things together, but we also must manage household matters and research. This undoubtedly increases our workload." Feeling overwhelmed or stretched too thin can negatively impact self-efficacy as teachers may question their ability to effectively manage their workload.

For resource constraints, John felt that "they did not have access to the necessary teaching materials, textbooks". Which may hinder their ability to deliver effective lessons and engage students.

3.3.5. School Examination System

Teachers universally face the challenge of reconciling student-centered education principles promoted by LS with the examination system's demand for an 80% pass rate. LS encourages holistic student development, while schools prioritize exam results. This dichotomy, as noted by Sun, forces teachers to balance these conflicting demands:

> "Emphasis on standardized tests pressures us to 'teach to the test.' Schools require an 80% pass rate, while LS prioritizes student-centered learning. Balancing these demands is challenging."

This complexity highlights how successfully managing the tension between holistic student development and exam readiness significantly impacts teachers' TSE. Their ability to navigate this challenge becomes a pivotal aspect of their professional development.

4. Discussion

Both Bandura and Wyatt underscore the significance of 'beliefs' in their definitions of self-efficacy (Bandura, 1989, 1997, 2012). Wyatt introduces domain specificity, suggesting that TSE beliefs may vary across different areas of practice. This flexibility poses a challenge in capturing the adaptability and specificity of teachers' self-efficacy beliefs within the TSE framework.

To address this challenge, our study employs a mixed research methodology to investigate how LS influences the development of TSE among EFL teachers in higher education. Specifically, we use the TSES to inform the qualitative component of our study. This qualitative phase explores participants' rationales behind their self-assessment of TSE, providing a comprehensive understanding of their self-efficacy.

Through qualitative data analysis, we assess the alignment between participants' TSES scores and their descriptions of TSE during interviews. This comprehensive approach, combining the TSES

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instrument and qualitative analysis, offers new insights into how teachers form and develop their self-efficacy beliefs and how these beliefs relate to their teaching practices.

4.1. Change in TSE

Our RQ1 investigates the impact of LS on TSE beliefs and practical knowledge of foreign language teachers before and after LS instruction. Overall TSE scores of the three teachers improved, aligning with the positive impact of LS on teacher professional development (Goei et al., 2020) and subsequent TSE improvements (Chong & Kong, 2012). However, when examining specific domains, all three teachers perceived higher TSE in *instructional strategy* and *student engagement*, with either a decrease or no change in *classroom management*. The contextual factors proposed by Bandura (1977), including students' abilities, motivation levels, classroom size, technology availability, and physical learning space conditions, may contribute to fluctuations in self-efficacy in class management.

We also observed that novice teachers, compared with experienced teachers, showed an increase in TSE, but the overall score was lower, particularly in teaching methods and *classroom management*. This performance gap aligns with Bandura's concept of mastery experience, indicating that limited teaching experience, as seen in Emma's case, may undermine TSE. This finding is supported by Lazarides et al.'s study (2020), which revealed a positive correlation between early-career teachers' *classroom management* self-efficacy and their perceived *classroom management*. Early-career teachers are more profoundly influenced by contextual resources, such as school climate, interactions with colleagues, and workload (Lazarides et al., 2020). Addressing their needs should involve strategies like workload reduction, support with initial professional registration, and quality mentoring programs to help them effectively manage initial demands.

4.2. Contributing Factors of LS to TES

Our focus in addressing RQ2 is to explore how LS influences the TSE beliefs of EFL teachers. Examining cases like John, Susan, and Emma highlights diverse impacts on their TSE. John's growth comes from collaborative reflections and feedback (verbal persuasion). Susan's enhancement stems from observing colleagues using interactive technology (vicarious experience) and successfully applying it herself (mastery experience). For Emma, LS addresses anxiety and insecurity about classroom uncertainties, positively influencing her psychological state.

These cases underscore collaboration in LS as a major factor contributing to both novice and experienced teachers' TSE development, supported by studies like Chong and Kong (2012), Mintzes et al. (2013), Puchner and Taylor (2006), and Schipper et al. (2018). LS, beyond collaboration, involves lesson planning and post-class reflection, key factors in improving TSE. In EFL education, LS emerges as a valuable professional development program, fostering collaboration, lesson planning, classroom observations, and reflective practices. This collaborative approach enhances TSE development, empowering teachers to improve teaching practices and student outcomes.

While LS positively impacted TSE, we observed no improvement in the *classroom management* ability of the three teachers. LS may enhance teaching development but might not address factors influencing *classroom management*, such as student quality. Further research is needed to explore LS-related challenges in *classroom management*.

4.3. Challenges Impacting TSE

Our RQ3 examines challenges in LS and their impact on teachers' TSE. Challenges are categorized into classroom management, cultural/contextual factors, initial resistance, time/resource constraints, and the school examination system.

- Classroom Management: Teachers face difficulties in maintaining discipline, impacting perceived control and efficacy.
- Cultural/Contextual Factors: Diverse student English foundations influence LS-driven teaching methods, affecting TSE based on teachers' emotional responses.

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- Initial Resistance: Illustrated by Susan, resistance to change in established routines negatively impacts TSE, causing uncertainty and self-doubt.
- Time/Resource Constraints: Challenges in coordinating LS activities with personal responsibilities due to limited time and resources.
- School Examination System: Contrasts with LS's student-centered approach, prioritizing exam results, posing a significant challenge that affects TSE.

In conclusion, the study highlights the necessity for continuous support, training, and effective strategies to help teachers manage these challenges and enhance self-efficacy within the LS framework.

5. Conclusion

In conclusion, our study underscores the intricate relationship between LS and self-efficacy. It emphasizes the role of collaboration as a catalyst for self-efficacy development and highlights the potential for LS to empower teachers to enhance their self-efficacy beliefs, ultimately contributing to the improvement of their teaching practices. This research offers a valuable foundation for further exploration, inviting future studies to delve deeper into the specific contextual factors influencing self-efficacy in different educational levels and to design LS frameworks that cater to the diverse needs of teachers. As teachers are at the heart of effective education, understanding the mechanisms that enhance their self-efficacy can have far-reaching implications for the betterment of teaching and learning.

6. Limitation and Future Implementation

In this study, however, there were some limitations. First, the teaching methods used by teachers in this study are inconsistent, which will lead to different effects on different teachers' TSE. Secondly, in this study, LS has a positive impact on TSE in terms of student participation and teaching methods, while it has little effect on classroom management, which should be further studied in future studies. At the same time, the teachers targeted in this study come from three different stages, from novice teachers to experienced teachers, and the influence of one's own experience will also affect the teachers' TSE and thus affect the accuracy of the results. Therefore, in the future research, we will further study and demonstrate the problems raised.

7. Declaration of Interest Statement

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

Author Contributions: Jiajia Li: Conceptualization, Methodology, Writing original draft preparation, Data curation, Writing- Original draft preparation. Mejia Lv: Data curation, Visualization, Investigation. Huixing Gao: Software, Validation, Writing- Reviewing and Editing. Zhijian Zhao: Software, Validation, Writing- Reviewing and Editing. Tianying Yun: Supervision, Funding acquisition.

Declaration: The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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