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CARMEM SILVIA DE SOUZA LIMA

**LESSON STUDY AND THE CONSTRUCTIONIST,
CONTEXTUALIZED, AND MEANINGFUL APPROACH FOR
INITIAL TEACHER EDUCATION**

Presidente Prudente – SP
2024

CARMEM SILVIA DE SOUZA LIMA

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CONTEXTUALIZED, AND MEANINGFUL APPROACH FOR
INITIAL TEACHER EDUCATION**

Tese de Doutorado apresentada ao Programa de Pós-graduação em Educação da Faculdade de Ciências e Tecnologia, UNESP/Campus de Presidente Prudente, como exigência parcial para obtenção do título de Doutora em Educação.

Orientador: Prof. Dr. Klaus Schlünzen Junior

Coorientadora: Prof^ª. Dr^ª. Alexandra Okada

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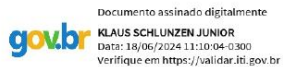
TÍTULO DA TESE: Lesson Study and the Constructionist, Contextualized, and Meaningful approach for initial teacher education

AUTORA: CARMEM SILVIA DE SOUZA LIMA

ORIENTADOR: KLAUS SCHLUNZEN JUNIOR

COORIENTADORA: ALEXANDRA OKADA

Aprovada como parte das exigências para obtenção do Título de Doutora em Educação, pela Comissão Examinadora:



Prof. Dr. KLAUS SCHLUNZEN JUNIOR (Participação Virtual)
Estatística / PROFEI/UNESP - Faculdade de Ciências e Tecnologias de Presidente Prudente/SP

Profa. Dra. CICERA APARECIDA LIMA MALHEIRO (Participação Virtual)
Mestrado Profissional em Educação Inclusiva (PROFEI) / UNESP

Prof. Dr. SEAN BRACKEN (Participação Virtual)
School of Education / University of Worcester

Profa. Dra. ADRIANA RITCHIT (Participação Virtual)
Ciências humanas e educação / Universidade Federal da Fronteira Sul (UFFS)

Prof(a). Dr(a). JOSÉ EDUARDO DE OLIVEIRA EVANGELISTA LANUTI (Participação Virtual)
Programa de Pós-Graduação em Educação / Universidade Federal de Mato Grosso do Sul

Presidente Prudente, 23 de abril de 2024

*I dedicate this journey to my dad (in memoriam),
who provided eternal love, support, and inspiration.*

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Gratitude is an act of such sublime value that allows us to transcend our ‘selves’ and recognize that we live in permanent interdependence with others. Therefore, I acknowledge that reaching this milestone was made possible through establishing meaningful connections, encountering the deepest respect, and being gifted with pathways that allowed me to make choices and experience blessings far beyond what I could have ever asked for or imagined.

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And “knowing how way leads on to way” (from Robert Frost's poem *The Road Not Taken*), I embark on this journey with gratitude for the paths I have traveled and look forward to the ones yet to unfold!

Escolas e professores: proteger, transformar, valorizar

Proteger... porque as escolas são lugares únicos de aprendizagem e de socialização, de encontro e de trabalho, de relação humana, e precisam de ser protegidas para que os seres humanos se eduquem uns aos outros.

Transformar... porque as escolas precisam de mudanças profundas, nos seus modelos de organização e de funcionamento, nos seus ambientes educativos, para que alunos e professores possam construir juntos processos de aprendizagem e de educação.

Valorizar... porque as escolas são espaços imprescindíveis para a formação das novas gerações e nada substitui o trabalho de um bom professor, de uma boa professora, na capacidade de juntar o saber e o sentir, o conhecimento e as emoções a cultura e as histórias pessoais.

António Nóvoa (2022, p. 6)

Schools and teachers: protect, transform, value

Protect... because schools are unique places of learning and socialization, of encounters and work of human relationships, and they need to be protected so that human beings can educate each other.

Transform... because schools need profound changes in their organizational and operational models and educational environments so that students and teachers can build learning and education processes together.

Value... because schools are indispensable spaces for the formation of new generations, and nothing replaces the work of a good teacher, of a good professor, in the ability to bring together understanding and feeling, knowledge and emotions, culture and personal stories.

António Nóvoa (2022, p. 6, our translation)

ABSTRACT

Lesson Study and the Constructionist, Contextualized, and Meaningful Approach for Initial Teacher Education

This research, conducted at the Graduate Program in Education at São Paulo State University (UNESP), Faculty of Sciences and Technology, Presidente Prudente, Brazil, is affiliated with the research line Formative Processes, Teaching, and Learning. The primary objective was to analyze the creation, implementation, and evaluation processes of a proposal for the initial teacher education. The focus was exploring how the interconnectedness of the Lesson Study (LS) methodology and the Constructionist, Contextualized, and Meaningful (CCM) approach can promote meaningful, collaborative, and inclusive educational practices. The research followed a qualitative exploratory descriptive methodological approach and was structured into four articles presented in a multi-paper format. The first article delved into the academic literature on the distinctive features of LS practices, assessed the cultural influences impacting LS implementation, and analyzed challenges hindering the successful application of LS in international contexts. The results demonstrated that time constraints, financial support, searching for quick results, and including knowledgeable others were critical to consider when introducing LS to a new context. The second article examined the contemporary concept of inclusion by revising international research literature on LS in inclusive settings. It explored the potential applicability of the CCM approach to establish improved conditions for inclusive education in conjunction with LS. The findings showed that LS exhibited commonalities with the CCM approach, fostering teacher collaboration for effective professional development and emphasizing the importance of students' voices in enhancing and transforming teaching practices for inclusion. The third article mapped out and explored the academic literature on the principal themes and issues influencing LS's development in Brazil. This study recommended refining research objectives for greater specificity, explicit identification of the adopted LS model, inclusion of knowledgeable others or external advisors, transparent sharing of encountered challenges, and wider dissemination of LS study experiences and outcomes to reach a broader audience. The fourth article explored whether participation in the Microteaching Lesson Study (MLS), underpinned by the CCM approach, facilitates collaborative learning and practical experiences toward inclusive education for student teachers. The results demonstrated a robust framework with principles and procedures aimed at improving the initial training of future teachers, including authentic teaching experience, enhanced collaborative learning, increased ability to reframe original teaching concepts, enhanced confidence in teaching skills, higher levels of understanding of student needs and effective teaching strategies, and increased awareness of theory and practice integration and inclusivity. We argue that teacher-preparation programs should engage students in collaborative reflective MLS experience and provide them with opportunities to build a professional knowledge base for teaching. The absence of innovative, active, reflective, collaborative, practical, and sustainable methodologies from the beginning of teacher training can result in difficulties when trying to restructure the school in search of new meanings about what it means to teach and learn, including everyone, without distinctions. We posit that LS, underpinned by the CCM approach, focuses not only on teacher learning or student achievement. It is centered on life. Finally, this thesis offers several recommendations for future research, including a more thorough investigation into whether MLS influences participants in the first cycle of in-service teaching and helps shape their identity.

Keywords: Teaching Methodology; Higher Education; Collaborative Learning; Inclusive Education; Microteaching.

RESUMO

Lesson Study e a Abordagem Construcionista, Contextualizada e Significativa na Formação Inicial de Professores

Esta pesquisa, conduzida no Programa de Pós-Graduação em Educação da Universidade Estadual Paulista (UNESP), Faculdade de Ciências e Tecnologia, Presidente Prudente, Brasil, pertence à linha de pesquisa Processos Formativos, Ensino e Aprendizagem. O objetivo geral foi analisar os processos de criação, implementação e avaliação de uma proposta para a formação inicial de professores e explorar como a interconexão da metodologia Lesson Study (LS) e a abordagem Construcionista, Contextualizada e Significativa (CCS) podem promover práticas educacionais significativas, colaborativas e inclusivas. A pesquisa seguiu uma abordagem metodológica qualitativa exploratória descritiva e foi estruturada em quatro artigos, sendo apresentada em formato *multipaper*. O primeiro artigo explorou a literatura acadêmica sobre as características distintivas das práticas de LS em diversos contextos, avaliou as influências culturais que impactam a implementação do LS e analisou os desafios que dificultam a aplicação bem-sucedida do LS em contextos internacionais. Os resultados demonstraram que restrições de tempo, apoio financeiro, busca por resultados rápidos e inclusão de especialistas foram aspectos críticos que devem ser considerados ao introduzir o LS em um novo contexto. O segundo artigo examinou o conceito contemporâneo de inclusão na literatura internacional sobre LS em contextos inclusivos e explorou a potencial aplicabilidade da abordagem CCS para estabelecer melhorias na educação inclusiva em conjunto com o LS. O estudo argumenta que a interconexão do LS e da abordagem CCS pode aprimorar as práticas de ensino inclusivas, promovendo uma educação que atenda às diversas necessidades de aprendizagem de todos os estudantes em ambientes educacionais inclusivos. O terceiro artigo mapeou e explorou a literatura acadêmica sobre os principais temas que influenciam o desenvolvimento do LS no Brasil. Este estudo recomenda o refinamento dos objetivos de pesquisa para maior especificidade; identificação explícita do modelo de LS adotado; inclusão de especialistas; compartilhamento transparente dos desafios encontrados; e maior disseminação dos resultados de LS para alcançar um público mais amplo. O quarto artigo investigou se a participação no Microteaching Lesson Study (MLS), fundamentado pela abordagem CCM, facilita a aprendizagem colaborativa e experiências práticas voltadas para a educação inclusiva de futuros professores. Este estudo gerou um quadro robusto com princípios e procedimentos voltados para a melhoria da formação inicial de professores. Argumentamos que os programas de formação de professores devem envolver os estudantes em experiências colaborativas e reflexivas de MLS e proporcionar-lhes oportunidades para construir uma base de conhecimento profissional para o ensino. A ausência de metodologias inovadoras, ativas, reflexivas, colaborativas, práticas e sustentáveis desde o início da formação de professores pode resultar em dificuldades ao tentar reestruturar a escola em busca de novos significados sobre o que significa ensinar e aprender, incluindo a todos, sem distinções. Postulamos que o LS não se concentra apenas na aprendizagem significativa do professor ou no desempenho do estudante, mas está centrado na vida. Finalmente, esta tese oferece recomendações para futuras pesquisas, incluindo uma investigação mais aprofundada sobre o potencial uso do MLS para influenciar os futuros professores no primeiro ciclo de ensino em serviço e auxiliá-los a moldar sua identidade.

Palavras-chave: Metodologia de Ensino; Ensino Superior; Aprendizagem Colaborativa; Educação Inclusiva; Microteaching.

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LIST OF ACRONYMS

B.A.	- Bachelor of Arts
CPE	- Cambridge Proficiency Exam
CEFR	- Common European Framework of Reference for Languages
LS	- Lesson Study
API	- Potentiating Environments for Inclusion
CCM	- Constructionist, Contextualized, and Meaningful approach
CCS	- <i>Abordagem Construcionista, Contextualizada Significativa</i>
UK	- United Kingdom
OECD	- Organization for Economic Co-Operation and Development
SDGs	- United Nations Sustainable Development Goals
UNESCO	- United Nations Educational, Scientific and Cultural Organization
ITE	- Initial Teacher Education
PRISMA	- Preferred Reporting Items for Systematic Reviews and Meta-Analyses
ERIC	- Educational Information and Resource Center
REDIB	- Red Iberoamericana de Innovación y Conocimiento Científico
SciELO	- Scientific Electronic Library Online

MLS - Microteaching Lesson Study

TIMSS - Third International Mathematics and Science Study

THIRD ARTICLE

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LIST OF ACRONYMS

LS - Lesson Study

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LIST OF ACRONYMS

LS	- Lesson Study
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FINAL THOUGHTS AND PERSPECTIVES

LIST OF ACRONYMS

CCM	- Constructionist, Contextualized, and Meaningful approach
LS	- Lesson Study
UNESCO	- United Nations Educational, Scientific and Cultural Organization
MLS	- Microteaching Lesson Study

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1 ACADEMIC AND PROFESSIONAL TRAJECTORY

Nobody becomes an educator on a specific Tuesday at four o'clock in the afternoon. Nobody is born an educator or destined to be one. We become educators; we shape ourselves as educators continually through practice and reflection on that practice (Freire, 1991, p. 58, our translation).

While numerous professionals typically begin documenting their academic and professional experiences from their university years, I must revisit my childhood days. Today, as I contemplate the factors that sparked my research interest, I realize those early experiences carry significant weight and profound meaning. This depth is something that a young girl who innocently embarked on her initial learning journey could never have comprehended. It marked the beginning of her greatest challenge: learning and later teaching English as a foreign language.

I began my English language studies in my hometown, Presidente Prudente, located in the interior of the state of São Paulo, Brazil, at the age of eight, in a private language school. This decision was made by my parents and met with my immediate acceptance. During that period, there was no debate about why a child should study a foreign language or the benefits of acquiring this knowledge. We simply studied.

It was when foreign language instruction relied solely on a teacher's mediation, supported by a textbook, chalkboard, and chalk. This methodology is now known as 'chalk and talk.' I must confess that I cherished every phoneme learned, every game, every doodle used to name objects in the new language, and every song. Our only guidance came from a teacher. Every pronunciation we learned came from a single voice. Those were times of contentment.

Several more years passed, and at the age of fifteen, I was invited by the language school director where I had been studying to assume the role of an English teacher for the first time. Of course, I could provide instruction of a different quality than a qualified and experienced professional. At that moment, I was offered no training; I had just replicated the teaching practices I had learned as a student.

My first two undergraduate degree programs were natural choices: a B.A. (Bachelor of Arts) in Language Sciences and a Translation and Interpretation program diploma, specializing in English and Portuguese languages. Throughout this period, I continued to teach English in private language schools. Also, I obtained the Cambridge Proficiency Exam (CPE), the most prestigious English proficiency exam offered by the University of Cambridge in the

United Kingdom, according to the Common European Framework of Reference for Languages (CEFR). It was a time of exploration and confirmation of my primary professional pursuit.

In those first years of my professional journey, I developed techniques and insights, often intuitive and lacking theoretical foundations, which, through trial and error, I adopted a more critical perspective on teaching and learning. Consequently, teaching experiences highlighted the urgency for me to deepen my understanding of how students learn, how teachers instruct, and what factors serve as sources of information for both in the educational process. Then, I chose: I added a new challenge to my teaching path – becoming an 'official' researcher.

The first step occurred during my specialization program, wherein I discovered my interest in understanding how a teacher can influence, support, and mediate learning so that students can achieve desired objectives. Driven by this need, I explored theoretical propositions and promising results that led me to research the topic of feedback in the academic context. As a culmination of the program, I presented my first scholarly work, a monography titled: 'Feedback as an Evaluative and Motivational Tool in the Process of Foreign Language Acquisition.'

From that moment on, a new perspective was inaugurated. I experienced how scientific research provides solid guidance for the teacher's conduct and forms the foundation for effective practice. Alongside certainties, numerous uncertainties became part of the context. It was no longer possible to live with so many questions without seeking answers to the endless concerns that continue to accompany me to this day. These uncertainties triggered a constant process of self-reflection, leading me to the Master's Degree Program in Education.

Underpinned by the Social Cognitive Theory (Bandura, 1986), I focused my investigation on examining how teachers facilitate self-regulated learning among sixth-grade students at a State Elementary School in São Paulo, concentrating on their instructional strategies and approaches. The Social Cognitive Theory views proactivity, self-regulation, and self-organization as human characteristics resulting from a dynamic relationship between the individual, their environment, and their behavior. It does not posit that individuals are solely influenced by the environment or exclusively driven by internal motivations. Instead, it recognizes individuals as active beings who do not live passively under external influences or unconscious internal impulses (Azzi *et al.*, 2014).

In this educational process, the teacher plays a central role in promoting and strengthening students' self-regulated learning. Considering the arguments from the literature that assert teachers are both learners and instructors (Frison; Simão, 2011), it is crucial to emphasize that this process is not only relevant for students. Teachers must understand it to

facilitate students' self-regulation and apply it in their teaching practice. Teaching inherently involves choice and control, the two pillars of self-regulation (Valle *et al.*, 2008; Zimmerman, 2002).

The research's findings confirmed that the teacher serves as the primary mediator of learning in the school context, making it imperative for them first to understand and experience the self-regulatory process. This involves familiarizing themselves with learning strategies, knowing which methods to use and when to use them, and understanding how to assess and monitor these strategies.

It is essential for teachers to strategically and metacognitively construct their learning to develop their pedagogical practice, aiming to foster in their students a process of reflection and responsibility towards their education. That research emphasized the relevance of involving and engaging teachers in research projects to ensure the desired outcomes are achieved and sustained. Furthermore, it underscored the teacher's role as a change agent, despite the challenges faced in education, as they remain the professional with the most significant influence on students within the school context.

Therefore, I believed there was much more to discover, and contrary to what some might have anticipated, I found myself increasingly captivated by the topic of teacher education. As a result, my doctoral project started to develop and gain focus. However, while discussing theoretical approaches underpinning a project proposal to a research funding agency, I was introduced to the Lesson Study (LS) approach.

During a specific meeting to refine this research proposal, Dr. Sean Bracken recommended LS as a suitable framework for developing teacher education from an inclusive standpoint. Following an in-depth exploration of literature encompassing LS's concept, application, purpose, perspectives, and guidelines, I recognized it as the appropriate theoretical framework to address my research questions. As a development of this study, this ongoing research was presented at the WALs 2023 Conference — World Association of Lesson Studies held in the Netherlands (Appendix 1).

The initial LS investigations brought me back to the beginning of my teaching career. In analyzing the research outcomes, I noticed many aspects I had experienced during that time and some challenges I continue to face. As Dudley (2013) noted, teachers often try to incorporate complex knowledge into their lessons when working alone.

These knowledge sets include pedagogical techniques, classroom management strategies, and subject matter expertise. The teacher accesses this knowledge from their own hidden and tacit reserves of practical experience. In other words, teachers use explicit

knowledge they have learned and intuitive, unspoken, and experiential knowledge gained through years of teaching practice. This hidden knowledge plays a significant role in shaping how teachers approach and deliver their classroom lessons.

Hence, I began to consider the process of a teacher's initial education as a central factor for the focus of my research. Additionally, as a participant in the research group "Potentiating Environments for Inclusion" (API) during my doctoral program, I had the opportunity to experience educational practices aimed at fostering the creation of a diverse and inclusive learning environment. Driven by the conviction that education only makes sense when available to all with equal opportunities for access and permanence, Schlünzen (2000) proposed the Constructionist, Contextualized, and Meaningful approach (hereafter referred to as the CCM approach) during her doctoral research investigations. In Brazil, home to this approach, this theory is referred to by its Portuguese acronym, CCS, which means *abordagem Construcionista, Contextualizada Significativa*.

In this constructionist learning environment, students construct learning based on their interests and have the opportunity to contextualize learning from the individual skills that emerge from their experiences and reality. In this process, the teacher mediates learning by formalizing and systematizing the new concepts that make learning meaningful. Accordingly, learning occurs in a cyclical movement called the learning spiral (Valente, 1999), which involves description, execution, reflection, and refinement, based on the theories of Papert, Piaget, Vygotsky, and Freire.

Incorporating the CCM approach, interconnected with the LS methodology, underscores my interest in employing collaborative and reflective methods to teacher education that bridge the gap between theoretical understanding and practical application. The emphasis on inclusive education emphasizes my broader interest in enhancing the efficacy of teaching and learning methods for a diverse range of students. Additionally, the special attention given to teacher training reflects my recognition of educators' pivotal role in creating inclusive learning environments.

This perspective on the importance of a diversified and inclusive learning environment, rooted in the CCM approach, resonated with me during my experience at The Open University, UK (United Kingdom). There, under the supervision of Dr. Alexandra Okada and as a member of the CONNECT project, I was able to deepen my understanding of teacher education. This experience highlighted how ongoing education for educators is crucial for implementing educational practices that respect and value students' cultural, social, political, and local differences.

During my doctoral program, I had the privilege of participating in a six-month tenure at The Open University, UK, as a Ph.D. visiting researcher under the supervision of Dr. Alexandra Okada. As a member of the CONNECT international project (connect-science.net), supported by the European Union and involving collaboration between Europe and Brazil in Open Schooling, I examined the teacher training process and how this endeavor influenced student learning. The focus was on understanding how cultural, social, political, and local factors influence this process. These discussions covered various topics, including Open Schooling practices and the foundational CARE-KNOW-DO framework (Okada, 2023) that underpins the CONNECT project.

This experience profoundly impacted my academic journey, shaping the trajectory of my doctoral research. Immersing myself in the CONNECT international project allowed me to gain invaluable insights into the intricate interplay between educational practices and contextual influences. The collaborative nature of the project, spanning across Europe and Brazil, provided a unique lens through which I could analyze the convergence and divergence of teaching methodologies.

Examining the teacher training process within the broader cultural, social, political, and local framework allowed me to appreciate the nuanced educational challenges and opportunities. The exposure to Open Schooling practices and the CARE-KNOW-DO framework not only broadened my theoretical foundation but also inspired critical reflections on the applicability of these concepts in diverse educational settings.

Reflecting on this enriching tenure at The Open University, I recognize how these experiences have significantly influenced my approach to doctoral research. The multifaceted discussions and collaborative endeavors have deepened my understanding of the complexities inherent in educational systems, providing me with a more nuanced perspective for framing and addressing research questions. Overall, this opportunity has been instrumental in shaping my scholarly identity and contributing meaningfully to developing my doctoral thesis.

The incorporation of these perspectives into this doctoral report reaffirms my belief in the significance of enhancing my understanding of teacher training. It also introduces a fresh perspective to my studies, specifically, the effort to build a more inclusive education. After all, I borrow Goei, Norwich, and Dudley's (2021, p. 1, emphasis added) words to ask: "How can one *not* be in favor of this aim and desire of catering to the needs of all learners?"

2 INTRODUCTION

2.1 Research importance and rationale

Establishing a high-quality, inclusive school is intricately connected to providing inclusive teaching practices in educational environments promoting inclusivity. One of the critical challenges researchers, education professionals, and policymakers face in delivering high-quality inclusive education is teachers' continuous professional learning and development (Simón; Echeita; Sandoval, 2018). Despite the complex nature of teaching and learning within an inclusive framework and the various factors that can influence these practices, existing literature widely agrees that a teacher's approach significantly impacts students' learning outcomes (Antoniou; Griaznova, 2018; Kirkpatrick; Johnson, 2014; Leithwood; Harris; Hopkins, 2008).

Recent challenges in establishing an inclusive school culture primarily revolve around teacher training, both initial and continuous, for regular classrooms and specialized education (Botes; Moreeng; Mosia, 2020; European Agency for Special Needs and Inclusive Education, 2014; Simón; Echeita; Sandoval, 2018). However, there is a promising potential for change in pedagogical approaches (Aas, 2020; Holmqvist, 2020; Norwich; Benham-Clarke; Goei, 2021) and, consequently, in the educational process.

Often, the focus has been on students with disabilities and special needs, neglecting to explore their full potential (Aas, 2020; Florian, 2019; Schlünzen *et al.*, 2020). Obstacles to inclusion extend to the lack of appropriate physical and architectural layout of school environments and limited accessibility, especially in technological aspects (Almaiah; Al-Khasawneh; Althunibat, 2020; Beaunoyer; Dupéré; Guitton, 2020; Dhawan, 2020; Kim; Yi; Hong, 2021; Leifler, 2020). Furthermore, school leaders often lack the knowledge to implement the guidelines outlined in public policies (Schlünzen *et al.*, 2020).

The concept of inclusive education, defined by the United Nations Educational, Scientific and Cultural Organization (UNESCO, 2009), refers to a comprehensive approach to addressing the diverse needs of children, youth, and adults. It emphasizes enhancing participation in learning, embracing various cultures and communities, and actively working to minimize exclusion within the educational system. Inclusive education requires substantial modifications in content, teaching methods, structures, and strategies. The underlying principle is to ensure that all children within the appropriate age group are included, and it emphasizes the regular education system's responsibility to educate every child. The Organization for

Economic Co-Operation and Development (OECD) supports this perspective as a universal policy challenge, underscoring the urgency and necessity of these principles (OECD, 2018).

Following the United Nations Sustainable Development Goals (SDGs) 4 and 10, which emphasize Quality Education (SDG 4) and Reduced Inequalities (SDG 10), respectively, it is imperative to address the critical issue of teacher professional development initiatives. SDG 4 underscores the significance of inclusive and equitable education that fosters learning opportunities for all, irrespective of their backgrounds or abilities. To achieve this goal, it is essential to invest in comprehensive teacher training programs that equip educators with the necessary skills and knowledge to implement effective inclusive teaching practices. These initiatives should create an inclusive learning environment where diverse learning needs are acknowledged, valued, and accommodated (Schlünzen *et al.*, 2020).

Additionally, SDG 10 emphasizes the importance of reducing inequalities within and among countries, including educational disparities. Addressing inequalities in education requires targeted efforts to bridge the gap between privileged and underserved communities. Teacher professional development initiatives must prioritize strategies catering to all students, ensuring they receive the necessary support to excel academically. This might involve culturally sensitive teaching methods, personalized learning approaches, and resources tailored to diverse learning abilities (UNESCO, 2023).

Like numerous countries embracing the concept of inclusive education, Brazil's focus has transitioned from a deficit-oriented model to a multifaceted view encompassing all areas of life, including social and educational services. In line with a broad comprehension of inclusion, the CCM approach was developed based on the initial studies conducted by the Brazilian educator and researcher Dr. Elisa Schlünzen (2000). Schlünzen (2000) defines inclusion as a comprehensive approach that ensures equal access to educational opportunities for all students, regardless of their social, economic, cultural, or physical circumstances. The CCM approach focuses on creating collaborative learning environments integrating technology, enabling all students to participate fully and meaningfully in the educational process. Schlünzen emphasizes the importance of cultural relevance and digital inclusion, aiming to bridge gaps and provide equitable resources and support to foster an inclusive educational experience for everyone involved.

Built on Papert's Constructionism (1986), which, drawing on Piaget (1972, 1976), the CCM approach advocates for transforming the concept of the teaching and learning processes through technology as a resource that provides students with concrete conditions to explore their intellectual potential. Valente (2005b) further defines this concept by stating that the

construction of knowledge in this perspective occurs through the tangible realization of an action manifested in creating a concrete and personally meaningful product.

To trace a timeline of the elaboration of the CCM approach, we refer to an overview of the expansion of constructivism theory to its actual understanding of the constructionism theory. Piaget's constructivist theory is a comprehensive framework that delves into the internal cognitive processes of learning. His work extensively focuses on how children's minds develop, think, reason, and understand the world at different stages of their growth. He investigated the internal mechanisms by which children construct knowledge, including how they assimilate new information, accommodate their existing knowledge structures, and achieve cognitive equilibrium (Piaget, 1976).

The constructionist theory, developed by Seymour Papert (1986), is an educational philosophy that builds on Jean Piaget's constructivist theory. Papert (1986, unpaginated) explains that:

The word constructionism is a mnemonic for two aspects of the theory of science education underlying this project. From constructivist theories of psychology, we take a view of learning as a reconstruction rather than as a transmission of knowledge. Then we extend the idea of manipulative materials to the idea that learning is most effective when part of an activity the learner experiences as constructing is a meaningful product.

Two ideas contribute to this knowledge construction, which differs from Piaget's constructivism. First, the learner builds a product; knowledge construction is based on “hands-on” and “heads-in” activities. Second, the learner builds something meaningful and of interest to them for which there is no pre-established explanation, and they are motivated. While constructivism emphasizes how learners construct their own understanding and knowledge of the world through experiences and reflection on those experiences, constructionism takes this a step further by highlighting the importance of learners actively creating tangible, meaningful products as part of the learning process. For Papert (1986, p. 8), this external construction facilitates internal understanding in which social and affective dimensions are as important as the technical content.

A central feature of constructionism is that it goes beyond what is usually called "the cognitive" to include social and affective facets of mathematics and science education. This feature leads us to a new approach to understanding and penetrating educational barriers related to gender, to cultural factors prevalent in many American minority groups and to personality issues that are often classified as learning disabilities.

To differentiate constructivism from constructionism, Ackermann (2001, p. 5) considers three dimensions:

The difference, as I see it, lays in 3 things: 1. In the role such external aids are meant to play at higher levels of a person's development, 2. In the types of external aids, or media, studied (Papert focuses on digital media and computer-based technologies) and more important, 3. In the type of initiative the learner takes in the design of her own "objects to think with."

Despite being necessary, the learner's having produced something is insufficient to ensure knowledge construction. The teacher plays a pivotal role in mediating the process and product development, fostering reflective opportunities, and cultivating learners' comprehension of concepts and strategies, as highlighted by insights from Piaget and Vygotsky (Valente; Blikstein, 2019). This collaborative aspect of learning, where teachers and learners work together, is a critical element of the knowledge construction process.

Building on Papert's work, Valente (2005a) emphasizes that learners construct knowledge most effectively when actively creating, building, or doing something meaningful. This hands-on approach enhances understanding and retention of information. Initially, this was understood as a cycle of actions, named description-execution-reflection-debugging. However, further studies led to a more precise understanding of learning as a 'spiral', a concept that views learning as an iterative and recursive process, similar to a spiral that continually revisits and builds upon previous understandings and experiences.

In line with Piaget and Vygotsky's ideas, Valente and Blikstein (2019, p. 260) argue for

[...] the need for teachers or more experienced persons to act as mediators, challenging students, creating conditions that promote interaction with objects being produced, and helping students understand the concepts and strategies used. Through these interactions with students, teachers can help students construct new knowledge, as well as reach a higher level of comprehension about what they are doing.

However, for teachers to effectively support and assist students in their learning process, they must receive training in integrating the students' activities with the disciplines in the curriculum (Valente; Blikstein, 2019). Driven by the need to transform pedagogical practices to enable the construction of knowledge during teaching while simultaneously promoting autonomy and inclusion, the CCM approach has gained prominence in the contemporary educational landscape, primarily due to its emphasis on the contextualized and meaningful construction of knowledge.

The central idea is that participants can establish connections between new content and their personal, professional, cultural, and social experiences, making learning more rooted and enduring and enabling the systematization and formalization of disciplinary concepts (Schlünzen *et al.*, 2020). Thus, the role of the teacher within the CCM approach is transformed.

Instead of being viewed as the sole source of knowledge, the more experienced professional takes on the role of facilitator and mediator, supporting students (or teachers in formative processes) in their investigations and discoveries. This perspective values developing essential 21st-century skills such as critical thinking, creativity, and collaboration. In this sense, learning is understood as a dynamic and deeply contextualized process.

The contextualized aspect of CCM argues that the data for pedagogical activities should emerge and align with the real-life situations of those involved. Concurrently, the meaningful nature of this approach presupposes that scientific and disciplinary concepts should be integrated with students' preexisting knowledge, reinforcing the idea of active and constructivist learning. CCM values critical reflection through projects from the interests of individuals undergoing educational processes, reinforcing that education should be a collective, collaborative journey.

To achieve this, changes in pedagogical actions involve considering what teachers do, feel, and say, as well as the work situation with others (students, colleagues, parents) anchored in the complex task of teaching, giving meaning to something for the students, and a specific work environment that is part of a particular social context (Schlünzen *et al.*, 2020). To this end, it is pivotal to promote professional teaching-learning methodologies and encourage teachers to adopt a multidimensional work perspective, fostering the ability to reflect on the necessity of their initial and ongoing professional development.

In this respect, according to Dudley (2013), effective teacher-learning models and conditions indicate that teacher learning conducive to improved student learning is characterized by several key factors:

1. Duration of learning: teacher learning should extend over weeks rather than days, allowing for a sustained and in-depth exploration of pedagogical concepts and practices.
2. Classroom-centered learning: the classroom is the central hub for professional learning activities. This setting allows teachers to directly apply learned strategies and techniques in their everyday teaching environments, facilitating practical and context-specific learning experiences.
3. Incorporation of experimental inquiry: teacher learning should incorporate experimental inquiry into pupil learning. This approach encourages educators to systematically investigate and analyze student learning outcomes, promoting evidence-based instructional practices.
4. Collaboration with peers: collaborative engagement with one or more fellow professionals is essential in the teacher-learning process. Interacting with peers fosters the

exchange of ideas, feedback, and diverse perspectives, enhancing the overall learning experience and encouraging the implementation of innovative teaching methods (Dudley, 2011).

Effective teacher learning that significantly contributes to improved student learning occurs through extended learning periods, classroom-focused activities, experimental inquiry into student learning, and collaborative partnerships with other professionals. All four elements mentioned above exist in the LS approach (Dudley, 2013). These components collectively establish a robust foundation for initial and ongoing professional development, fostering improved teaching practices.

The LS methodology supports teachers in collaboratively developing methodologies grounded in systematic observation, data collection, and analysis of actual classroom lessons to gather empirical evidence on what works best in their educational contexts. According to Murata (2011, p. 2), in LS, “teachers organically come together with a shared question regarding their students’ learning, plan a lesson to make student learning visible, and examine and discuss what they observe.” This process ensures that instructional practices are not based merely on tradition, intuition, or anecdotal evidence but are informed by concrete data and research findings (Fujii, 2016). LS facilitates a continuous cycle of improvement where educators refine teaching techniques using classroom data, enhancing the overall effectiveness and quality of education. This methodology fosters a scientific and research-oriented approach to teaching, ensuring instruction decisions are supported by evidence from teachers’ perspectives.

In this thesis, learning evidence is understood in line with the constructionist conception. While producing a product is fundamental, the fact that a product is made is insufficient to ensure that the learner constructs knowledge and, therefore, to guarantee learning evidence. Learners must be able to reflect and develop awareness of their concepts and strategies (Valente; Blikstein, 2019). Learning cannot be seen as an instant activity or a simple and visible phenomenon. Instead, social, historical, cultural, biological, and personal perspectives must be considered to understand that the purpose of education goes beyond enhancing visible learning processes and results. Regarding this, Larsen (2019, p. 10) posits that

[...] there are major ‘innate’ obstacles to visibility and to the visible learning paradigm. Blindness is an inevitable part of educational seeing. The influential scientific and political adherents of learning cannot see what they cannot see—neither when they see what they (think they) see nor when they do not see what they do not (want to) see.

In this thesis, learning evidence is not judged based on some abstract determination of whether the proposed activity promoted the learning or understanding of a specific skill or concept but based on concrete evidence from the participants' voices, the written material produced by them, the observing sessions, and the knowledge others perspectives. The intention is to understand how participants responded to the tasks and whether they were helpful in changes and inspired them to pursue their goals. To clarify my position, I share Larsen's (2019, p. 3) perspective in arguing that

Learning very seldom offers instant gratification and can never be understood nor lived independent(ly) of the dynamic interpretation of the ever-changing learning subject her or himself. It is a myth that learning is present and observable instantly in a moment and that it can be measured, exposed, and treated as a fixed object.

According to Dudley *et al.* (2019), LS (a teacher and school development methodology) is often confused with curricular and pedagogical interventions, leading researchers and stakeholders to evaluate it as such. However, the authors argue that "lesson study is a process for optimizing innovation, development and implementation of effective classroom learning" (Dudley et al., 2019, p. 27). Given the complexity of teaching and human learning, LS gained international recognition for its iterative nature of providing opportunities for teachers to create and share knowledge that can be used immediately and does not need to be translated to them as knowledge emerges from the classroom.

LS became globally known among educators primarily due to Stigler and Hiebert's publication of "The Teaching Gap" in 1999. This book presented findings from the Third International Mathematics and Science Study (TIMSS) video study, which analyzed eighth-grade mathematics lessons in the United States, Germany, and Japan. Although their focus is examining mathematics lessons, the authors clarify that the discussions and the findings presented "go well beyond mathematics" and "would be of interest to teachers in all subjects at all levels" as well as educational stakeholders (Stigler; Hiebert, 1999, p. xi). Chapter seven, "Japan's Approach to the Improvement of Classroom Teaching," drew on Yoshida's 1999 doctoral dissertation, sparking significant interest in LS and the typical structure of Japanese mathematics lessons. Additionally, educators like Lewis acknowledged the importance of the Japanese LS and contributed to its worldwide recognition (Lewis; Tsuchida, 1998).

The concept of LS revolves around a professional development model grounded in reflection and collaborative learning, emphasizing the principles of mutual understanding to continuously enhance teaching practices (Norwich, 2018; Takahashi; McDougal, 2016). The primary objective of LS is to improve the quality of education and address learning challenges

(Dudley *et al.*, 2019), and “the most effective place to do so is in the context of a classroom lesson” (Stigler; Hiebert, 1999, p. 111).

Developed in the Japanese educational system, LS is designed to lead to gradual, incremental improvements in teaching. The system includes clear learning goals for students, a shared curriculum, support from administrators, and the dedicated efforts of teachers striving to improve their practice over time. The idea behind LS is that improving student learning requires understanding their interests, motivations, and difficulties and finding ways to offer a teaching methodology that addresses their needs. The best place to investigate these needs is during a lesson in a standard classroom (Stigler; Hiebert, 1999).

According to Japan’s system of improvement, individual innovation and creativity alone cannot improve teaching in the average classroom or change standard teaching practices. While Western culture tends to praise teachers who stand out for their creativity and innovation, the Japanese focus on improving the collective standard practices of all teachers in the country. When teachers work collaboratively to investigate their own practice and share what they have learned, they produce cumulative knowledge for future generations. In other words, LS is a bottom-up system designed and developed by teachers who can learn from their own experience. (Stigler; Hiebert, 1999).

In a typical LS cycle, small teacher groups (approximately 5 to 7 teachers) work together to study the curriculum and relevant materials and plan a 'research lesson,' which is taught by one member while the others observe student learning (Dudley, 2011). The lesson is subsequently assessed, considering the teacher's reflections and insights from the observers. Following this, the lesson may undergo revisions for future teaching with different classes (Hiebert; Stigler, 2000) (Figure 1). What sets this apart from other professional development methods is the collaborative planning of research lessons specifically designed to address particular issues (Cajkler *et al.*, 2015). Essentially, LS constitutes a comprehensive, teacher-led system to enhance the quality of teaching and learning (Cerbin; Kopp, 2006).

Figure 1 - Collaborative stages of the Lesson Study professional development methodology.



Source: The Lesson Study Group at Mills College (2023). Available at: <https://lessonresearch.net/>.

While numerous studies (see reviews of Baumfield *et al.*, 2022; Larssen *et al.*, 2018) have underscored the potential of LS in prospective teacher programs, there are still significant knowledge gaps in our understanding of the mechanisms and learning processes related to LS, particularly within the context of this specific initial teacher education program. Past research has outlined the use of LS for inclusive teacher professional development, demonstrating positive and promising outcomes across diverse contexts (Cajkler *et al.*, 2013; Da Ponte, 2017; Fernández, 2010; Lertdechapat; Faikhamta, 2021; Munthe; Bjuland; Helgevold, 2016; Schipper *et al.*, 2020). However, integrating the LS process and the CCM approach remains a novel and innovative concept in Brazil and globally.

In this study, we integrate the principles of the CCM approach and propose implementing the LS approach in the initial training of pedagogy students from an inclusive perspective to investigate how to support future teachers' learning. First, we explored the intersections and commonalities between these two approaches and identified the factors that differentiate them. Table 1 was built to provide a detailed comparison of the convergences and divergences between the CCM and LS approaches, incorporating perspectives from experts in both fields.

Table 1. Comparative analysis between the Constructionist, Contextualized, and Meaningful approach and Lesson Study.

Aspect	Constructionist, Contextualized, and Meaningful (CCM) Approach (Schlünzen <i>et al.</i> , 2020)	Lesson Study (LS) (Stigler; Hiebert, 1999)
1. Environment	Constructionist, wherein students propose and create products or artifacts based on their interests.	Students are encouraged to construct their own path of solving a problem in a way that makes sense to them, and that can be used immediately. LS begins with a question crafted by the teacher team, not a pre-prepared answer. This question addresses a problem that becomes the research topic for LS, constituting the first step in the process. “Usually the problem teachers choose is one they have identified from their own practice.” (Stigler; Hiebert, 1999, p. 112).
2. Learning context	Student-centered learning is based on their interests and concerns. Students develop an artifact that facilitates acknowledging and communicating their knowledge, making it a concrete product.	LS maintains a constant focus on student learning. The goal of improving teaching is improving students’ learning. Thus, throughout the LS process, teachers plan, implement, and assess their work with a central focus on the students' interests as learners.
3. Teacher's role	Mediator of learning by systematizing emerging concepts during learning construction, giving them meaning.	Design and conduct lessons allowing students to invent their own procedures for solving the proposed problems. Rather than explaining concepts and procedures, the teacher provides scaffolds and monitors students’ solution methods. By the end of the lesson, the teacher leads a discussion to conclude and summarize the major points of the class.
4. Student engagement	Students work according to their abilities and interests, leading to meaningful task engagement.	LS implementation ensures knowledge does not occur in isolation but fosters real experiences that profoundly impact students and promote lasting effects. Students work on developing solution procedures. Thus, LS encourages the idea of student-controlled tasks.
5. Teacher training	Initial and in-service training for CCM teaching. Training should encompass professional (teaching and school institution) and personal (life, history) aspects.	The continuous professional development begins as soon as teachers begin their teaching careers. The training focus is on the lesson, not on the teacher. The aim is not to improve individuals’ expertise; instead, the gradual and shared LS process aims to improve the teaching system in the long term.
6. Integration into daily school life	CCM environment can be developed in everyday school life, bridging theory and practical applications within the school context.	Teachers investigate teaching practice where teaching occurs: in the classroom. In doing so, teachers become researchers of their practice, “making it unnecessary to translate one into the other” (Stigler; Hiebert, 1999, p. 122). Knowledge generated by LS is immediately usable, contrary to the knowledge produced by educational researchers.

Aspect	Constructionist, Contextualized, and Meaningful (CCM) Approach (Schlünzen <i>et al.</i> , 2020)	Lesson Study (LS) (Stigler; Hiebert, 1999)
7. Focus of teaching	Shifts from teacher to student learning.	Shifts from teacher to teaching and building the profession's knowledge base. And "the goal of improving teaching is improving students' learning" (Stigler; Hiebert, 1999, p. 132).
8. Collaborative reflection	Teachers collaboratively reflect on systematizing emerging concepts and plan future activities based on these reflections.	LS refers to teacher learning that happens collaboratively, not limited to planned and taught lessons. "Teachers must have the opportunity to enlarge their horizons beyond their own classrooms and their schools" (Stigler; Hiebert, 1999, p. 175). Teachers collaborate and share their insights to enhance good teaching, strengthening each other's learning.
9. Student assessment	Student self-assessment allows for understanding individual and collective perceptions and analyzing teachers' performance.	Student improvement is expected to occur consistently and gradually. Although LS is essentially a teacher activity aimed at student learning, the process focuses on how the students build their knowledge to solve the daily challenges teachers propose.
10. Collaborative professional development	Collaborative work among teachers fosters collective professional development and enables overcoming challenges.	Improved teaching is a joint process. Thus, teachers "treat the result as a joint product whose ownership is shared by all in the group" (Stigler; Hiebert, 1999, p. 125). The idea is not to celebrate one teacher who stands out for their innovation and creativity because this cannot change the standard practice. "And if we intend to improve the practice of the profession, it is the standard, common practice that must improve" (Stigler; Hiebert, 1999, p. 175).
11. Involvement of parents and community	The CCM approach facilitates closer collaboration between parents and teachers for more accurate student assessment.	LS is a native practice in Japan, where teaching is viewed as a public activity and learning as a community activity rather than an individual or private one. "Improving something as complex and culturally embedded as teaching requires the efforts of all the players, including the students, parents, and politicians. But teachers must be the primary driving force behind the change" (Stigler; Hiebert, 1999, p. 135).
12. Inclusive culture transformation	It strives for internal transformation and requires a review of pedagogical strategies and preconceived beliefs.	Individual difference is viewed as a natural and beneficial characteristic of a group because they produce a range of ideas and solution methods that provoke discussion and reflection. "In addition, tailoring instruction to specific students is seen as unfairly limiting and as prejudging what the students are capable of learning; all students should have the opportunity to learn the same material" (Hiebert; Stigler, 1999, p. 94).
13. Continuous refinement of pedagogical practices	The pedagogical practices must be constantly refined.	Development of an LS theme can last for months or even years. There is constant reflection and adjustments in procedures, often with the aid of a specialist. As Japanese teachers and researchers consider

Aspect	Constructionist, Contextualized, and Meaningful (CCM) Approach (Schlünzen <i>et al.</i> , 2020)	Lesson Study (LS) (Stigler; Hiebert, 1999)
		LS an integral part of the teaching profession, improvements are expected to be continual, gradual, and incremental. The idea is to “build a system that can learn from its own experience” (Stigler; Hiebert, 1999, p. 136).
14. Partnership development for projects	CCM projects often involve partnerships between state or municipal education departments, higher education institutions, and research support agencies, aiming for in-school education and life-long learning opportunities.	Local, regional, and national educational institutions must share responsibilities to provide time, financial support, and means "to endorse teachers' collaborative work to plan, teach, collect evidence, and revise lessons" (Stigler; Hiebert, 2016, p. 585).
15. Valuing learning pace and diversity	Learning pace, skills, and individual potentialities are valued. Difficulties are respected.	LS advocates a "bottom-up" professional development practice where a small group of teachers (approximately 5 to 7) decides to research a common topic for all. Especially for LS beginner teams, Dudley (2014) recommends using a conduct protocol to promote common expectations within the group and encourage everyone to share their ideas, concerns, and challenges without fear of criticism.
16. Collaborative work in an inclusive perspective	Teachers and students collaborate in an inclusive perspective. Each participant contributes based on their potential and perspectives.	Teachers participating in an LS team engage in a research-action project about teaching. Senior and novice teachers collaborate based on their resources and experiences, participating in discussions with equal opportunities for contribution. It is acknowledged that “not all students will be prepared to learn the same things from each lesson, and the different methods that are shared allow each student to learn some things” (Stigler; Hiebert, 1999, p. 95).

Source: The author (2024).

To comprehensively assess the perspectives above, it is imperative to consider aspects that do not resonate in both approaches. It becomes evident that the CCM approach centers the student within their learning process from the inception, while the LS methodology is embedded in the professional development of the teacher and, consequently, does not consistently involve the student actively when teachers meet to decide what problem will be investigated and formulate the central question that will guide the process. In the latter methodology, the students frequently emerge responsible for developing the work. In contrast, in the former approach, the students propose what works and how they are willing to create it. It is essential, therefore, to delve more profoundly into the dimensions that fail to produce intersections between the CCM approach and LS methodology and analyze which path proves more suitable for addressing the emerging demands. Although acknowledged, this path remains unconsolidated and must be constructed while implementing our fieldwork.

This research is motivated by the need to evaluate how collaborative practices can enhance the initial professional development of pedagogy students, aiming to i) bridge practical knowledge and theoretical understanding during their training, ii) render the initial education meaningful, and iii) foster collaborative and sustainable practices. Consequently, this doctoral research focuses on the challenge of creating, implementing, and evaluating a collaborative and meaningful professional development proposal for pedagogy students from an inclusive standpoint. Structured into four articles in a multi-paper format, this thesis explores whether the practices employed in this training process, based on the CCM approach, contribute to a deeper understanding of the pedagogical practices of students undergoing initial education for an inclusive school.

3 RESEARCH QUESTIONS AND OBJECTIVES

3.1 Research questions

In the light of this understanding, the research questions proposed for this thesis are as follows:

1. How can the LS methodology and the CCM approach be articulated to promote meaningful, collaborative, and inclusive educational practices effectively?
2. How can a Brazilian Pedagogy program formulate, implement, and evaluate a proposal for initial teacher education to foster collaborative and meaningful connections between practice and theory from an inclusive perspective?

Therefore, this research proposes the following thesis as the central argument guiding this study process: implementing the CCM approach, in conjunction with the LS methodology, can enhance the initial training of teachers in Brazil, fostering more collaborative, meaningful, and inclusive educational practices.

3.2 Main objective

Analyze the creation, implementation, and evaluation of a proposal for the initial teacher education of Brazilian Pedagogy students, as well as explore how the interconnectedness of the LS methodology and the CCM approach can effectively promote meaningful, collaborative, and inclusive educational practices.

3.3 Specific objectives

- Identify and analyze the academic literature on the distinctive features of LS practices across various settings, assess the cultural influences impacting LS implementation, and explore challenges hindering the successful application of LS in international contexts.
- Examine the contemporary concept of inclusion by investigating international research literature on LS in inclusive settings and explore the potential applicability of the CCM approach to establish improved conditions for inclusive education in conjunction with LS.

- Map out and analyze the academic literature on the principal themes and issues influencing LS's development in Brazil.
- Explore whether participation in MLS, underpinned by the CCM approach, fosters collaborative learning and practical experiences towards inclusive education for student teachers.

4 METHODOLOGICAL PROCEDURES

In this section, I present the research methodology. The objective is to offer descriptions, explanations, and, more importantly, the path to cross this journey. As a result of the study's overarching aim and specific objectives, it became imperative to delineate the methodological framework conducive to facilitating data production, selection, and analysis. Thus, we discuss how participants engaged in this investigation and how this process enabled the researcher to obtain insights into what participants experienced and understood from what they lived throughout this study.

As this research was a dynamic, cyclical process, it was propelled by constant interactions, negotiations, active involvement, and participant feedback. This methodological trajectory is thus characterized as a qualitative approach of an applied nature. Following the CCM approach and the LS methodology, theoretical frameworks were harnessed to underpin this study; the action research method took the lead in organizing data production, analysis, and interpretation. The philosophical perspective that underpins this process is phenomenology, which constructs meanings based on the observations and actions of all participating agents.

It is important to emphasize that the fourth article will present some critical aspects of the research methodological design with direct implications for the empirical stage of this investigation, such as the ethical procedures, the context of the research, and the characterization of the participants. Due to their specificities and to avoid duplicate information, each article will delineate its proper data production and analysis procedure.

4.1 The qualitative approach and the researcher

[...] the thinker, imaginer, and hypothesizer – that is, the qualitative researcher – is the data analyzer (Gay; Mills; Airasian, 2012, p. 467).

The fundamental aspect of qualitative research lies in exploring and understanding individuals' experiences through their own words. According to Lüdke and André (2013), qualitative research can employ multiple methods and adopt an interpretative, naturalistic approach to its focus of study. It is grounded in the principle that researchers, by immersing themselves in the research process, become participants in their natural environment, seeking to comprehend or interpret phenomena based on the meanings attributed to them by individuals. Considering that the natural environment (the initial teacher program offered at a State University) was used as a direct source for obtaining data and the researcher worked directly in

contact with the environment and the situation being investigated (Lüdke; André, 2013), this research assumed a qualitative approach.

By delving into participants' lived experiences, perspectives, and emotions, qualitative researchers gain deeper insights into how individuals perceive and interpret the world around them. This approach enables researchers to access rich insights into various phenomena, social contexts, and subjective realities (Sutton; Austin, 2015). Thus, through a qualitative approach, researchers can uncover unique insights, perspectives, and meanings and appreciate the complexity of human experiences that might not be captured through other research approaches (Denzin; Lincoln, 2000).

While this study adopts a qualitative approach, it is essential to note that quantitative elements were also integrated into the data production process. The complementary nature of these data not only enhances analytical rigor but also serves as a means to validate participants' perceptions. Triangulating qualitative and quantitative data also enabled the researcher to set aside personal biases and gain a fresh perspective on the phenomenon under examination (Creswell, 2013).

Given that individuals' observations are highly influenced by their personal and cultural backgrounds (Lüdke; André, 2013), it becomes crucial to understand how the researcher, who also serves as an English teacher, translator, and interpreter (among other roles), positions herself regarding all aspects of this research. This underscores the active role of the researcher in maintaining a balanced and transparent posture of intense interaction and communication with participants, shaping the study and its interpretations (Ana; Lemos, 2018). As claimed by Collins and Stockton (2022, p. 8):

In the theater of qualitative research, we find a whole world of understanding life, meaning, interaction, and communication—all of which are core to the purpose of qualitative research and the quest to become a better researcher. The reflective role can enhance knowledge of self, purpose, and ability to connect with participants.

Therefore, it is impossible to completely dissociate this research from my life history, specifically from my professional journey as a teacher actively engaged in teaching the English language to Portuguese-speaking students for many years. Likewise, my worldview, including my perspectives on teaching and learning, understanding of inclusive education, linguistic comprehension, and interpretation of the research context, cannot be overlooked. Despite efforts to minimize personal influence ('bracketing'), as Creswell (2013) suggested, complete detachment is unrealistic. Instead, I adopt the perspective of Collins and Stockton (2022),

viewing research as an interactive process inevitably shaped by my personal and academic background and other participants.

4.2 Action research

The purpose of action research is to provide teacher researcher with a method for solving everyday problems in schools (Gay, Mills, Airasian, 2012, p. 508).

This research was constructed with a focus on valuing a dialogical and collaborative process with the participants. At various points during the empirical implementation of this research, the object of study was presented and discussed by all involved parties, establishing moments of enrichment of the proposal and recognition of the need for adjusting the steps initially planned to address the issues posed by the investigated reality.

In line with the conceptual framework of the CCM approach and the MLS methodology, from the very beginning, participants were informed that what was being investigated was their process of learning, reflecting, discussing, and collaborating. The aim was to develop more effective and critical initial teacher training towards inclusive education. Hence, studying the object of investigation during its manifestation in several activities and interactive procedures was more important than the final product.

The entire trajectory of the research was mediated by the effort towards transformative action in reality, from the delineation of the problem developed throughout the first three articles to the implementation of the proposal within the context of initial teacher education, along with the procedures for data collection, selection, and analysis. As the research development progressed, it became clear that the actions involving all the participants toward exploring, seeking solutions, and offering contributions to the issue under investigation indicated the methodological framework of action research. Stated differently, this research is not merely constituted by action or participation. This study is centered on producing new knowledge acquired through experience to contribute to the discussion and advance the debate on the proposed issues.

According to Thiollent (2011), a research study qualifies as action research when individuals or groups involved in the observed problem actively take action. Furthermore, for an action to meet the criteria of action research, it must not be trivial; instead, it should represent a problematic situation that warrants investigation, development, and implementation. According to the author,

Action research is a type of empirical-based social research that is conceived and conducted in close association with an action or the resolution of a collective problem, in which researchers and participants representing the situation or problem are involved cooperatively or actively. (Thiollent, 2011, p. 20).

In this respect, Esteban (2003) considers that critical aspects involving action research include: i) seeking to transform and improve an educational reality; ii) beginning with practice, addressing practical problems; iii) involving collaboration among individuals; iv) entailing systematic reflection on action; v) integrating knowledge and action; vi) being carried out by the people involved in the investigated practice; vii) having training as its fundamental and primary element; viii) being characterized as a spiral of change.

John Elliot (2019), a renowned expert in the LS methodology, further discusses this conception and claims that LS is a form of practice-based educational action research grounded in the practical experience of those engaged in such research. The author argues that, based on his experience as a participant in and a facilitator of action research, LS is conducive to providing high-quality educational research under certain conditions: i) if it focuses on genuine practical concern; ii) it seeks to understand teachers' practical problems through diverse perspectives, including direct experience and observation; iii) if it allows teachers to question and test their tacit theories against practical evidence; and iv) if it fosters a democratic process of knowledge construction in which teachers engage in rational examination with students and peers.

Drawing on these assumptions and coherent with the overall conception of this study, we established the principle that the outcomes of this investigation should directly address issues intrinsic to the participants' context. In this sense, the knowledge production sought in elaborating this thesis is closely associated with the engagement of participants in delineating the problem focus for investigation and involving them in understanding the practical issue to present potential solutions.

Accordingly, within the scope of the research object, it became necessary to study the development, implementation, and evaluation of the results of initial teacher training from an inclusive perspective underpinned by the CCM approach. Therefore, the research approach was practical and collaborative, aiming to propose a reflection on action and the knowledge built throughout the process.

In applied social research, particularly in action research, the problems posed are initially practical. As a guiding compass, action research serves as a method for conceiving and organizing social research with valuable and relevant objectives, aligning with the specific

requirements for action and participation among stakeholders in the observed context. This involves seeking solutions to achieve a purpose or realize a potential transformation within the observed situation (Gay, Mills, Airasian, 2012).

This research was conducted according to the following steps proposed by Thiollent (2011): i) analysis and delimitation of the initial situation; ii) delineation of the final situation, based on desirability and feasibility criteria; iii) identification of all problems to be solved to enable the transition from (a) to (b); iv) planning of corresponding actions; v) execution and evaluation of the actions.

4.3 Phenomenological research

In our endeavor to capture how the participants of this research (student teachers) experience their learning (the phenomenon) in their natural setting (initial teacher education program) and the meanings they attribute to them, we found educational phenomenological research to be the appropriate common thread underlying the investigative approach.

Phenomenological studies aim to discover the essence underlying how people describe their lived experiences of a concept or a phenomenon (Creswell, 2013). Hence, phenomenological research is not concerned with knowing what causes something; instead, it emphasizes the individual and subjective aspects of those experiences (Esteban, 2003). In a holistic assumption, phenomenological education fosters the development of the human being, who is constantly evolving, involving society, culture, and the individual (Santos; Sousa, 2022).

Since every experience can promote learning, the primary focus of phenomenological studies in education is, according to Santos and Sousa (2022), to enable positive or negative experiences, as these experiences allow for understanding the specifications presented. Education from a phenomenological standpoint does not perceive humans merely as body and reason, social or individual, reason or emotion, sense or intellect, objective or subjective, but rather as a whole, appreciating all their facets: physical, intellectual, social, emotional, and imaginative.

To conduct well-structured phenomenological research, Creswell (2013) recommends the following procedural steps: i) describe the individual meaning of the experiences with the phenomenon under study, highlighting central ideas present in the narratives and significant quotes that help in understanding the lived experience; ii) group these ideas into significant statements (overarching themes); iii) identify and group situations/contexts in which significant statements appear, calling them ‘meaning units’ or themes; iv) write a text describing the

essence of ‘what’ the participants experienced and ‘how’ they experienced it (the contexts in which the experience occurred); v) reflect on the similarities and differences between the essence described by the researcher (after data analysis) and the literature in the area.

This research manifests through a phenomenological perspective in line with these presuppositions. Drawing from the research questions and the objectives proposed, our interest was to make sense of and interpret the object of study in terms of the meanings or concepts participants brought to it. In practical terms, the constructionist concept inherent in the methodological framework supporting this research, the CCM approach, asserts that participants can construct the meaning of the object of study through ongoing discussions, interactions, and reflections. Furthermore, integrating the LS methodology ensures the ‘process’ of interaction within the research construction.

Despite being a fundamental characteristic of a phenomenological study, the researcher acknowledges that her background shaped her interpretation and recognizes how her personal, cultural, and historical experiences serve as the lens through which relevant discussions are conducted. However, while this feature is inherent to phenomenology, Creswell (2013) advises researchers to be cautious in ‘bracketing’ their personal experiences to construct the meaning of participants. Considered an ethical issue, bracketing is a process in which the researcher sets aside, as far as humanly possible, to hinder all beliefs, feelings, and preconceived experiences best to understand the participants' experiences in the study and, thus, be more faithful to the phenomenon.

As previously mentioned, the thesis's rigorous and detailed methodological approach led to the development of four significant scientific articles. In the following section, each article will be introduced, illustrating how each reflects a unique aspect of the research and demonstrating the breadth and depth of the study undertaken.

5 OUTLINE OF THE THESIS

This research is structured across four interrelated articles, each mutually dependent on the others to address the research questions and achieve the proposed objectives. Consequently, this Thesis adopts a multi-paper format. Table 2 details the methodological procedures applied to the specific objectives and the articles that constitute the thesis.

Table 2 - Methodological procedures in research articles.

Objective	Type	Origen/Participants	Registers	Resulting Resource
Identify and analyze the distinctive features of LS ¹ practices across various settings, assess the cultural influences impacting LS implementation, and analyze challenges hindering the successful application of LS in international contexts.	Systematic Literature Review	Peer-reviewed articles from 5 international academic databases	Analysis, synthesis, and the discussion.	A database with relevant entries resulting in themes for analysis.
Examine the contemporary concept of inclusion by investigating international research literature on LS in inclusive settings and explore the potential applicability of the CCM ² approach to establish improved conditions for inclusive education in conjunction with LS	Theoretical Paper	Comprehensive national and international literature	Analysis, synthesis, and the discussion.	Theoretical assumptions correlating the CCM approach and the LS methodology.
Map out and analyze the academic literature on the principal themes and issues influencing LS's development in Brazil.	Scoping Literature Review	Peer-reviewed articles from 5 national and international academic databases	Analysis, synthesis, and the discussion.	A database with relevant entries resulting in themes for analysis.
Explore whether participation in MLS, underpinned by the CCM approach, fosters collaborative learning and practical experiences towards inclusive education for student teachers	Qualitative Exploratory Research	33 Pedagogy students from a public state university in Brazil.	Analysis of the elaboration, implementation, and evaluation of an ITE ³ model in a specific context focusing on inclusion	Propose an ITE model for a particular context focusing on inclusion.

Source: The author (2024).

LS¹ = Lesson Study

CCM² = Constructionist, Contextualized and Meaningful

ITE³ = Initial Teacher Education

The first article, Insights Towards Cultural Aspects and Related Impacts of Lesson Study Practices: A Systematic Review (Fluminhan; Schlünzen; Schlünzen Junior, 2024), was

recently published in Portuguese and English in the *Educação em Revista* Journal (ISSN 1982-6621 online) and is available at <https://periodicos.ufmg.br/index.php/edrevista/issue/view/2199>. Its initial version is accessible on the preprint server OFS at <https://osf.io/preprints/socarxiv/j9f3p/>.

This study aimed to (1) identify specific features of LS practices as developed in diverse settings, (2) examine and analyze the cultural aspects influencing the implementation of LS, and (3) scrutinize and develop an analysis of challenges associated with the successful application of LS practices in international contexts. The investigation adhered to a meticulously prepared research protocol, exploring and scrutinizing the primary approaches adopted by researchers in the field. This was done following the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) statement (Moher *et al.*, 2015).

The data collection process involved a comprehensive search conducted in October and November 2020 across 5 electronic databases: Educational Information and Resource Center (ERIC), Red Iberoamericana de Innovación y Conocimiento Científico (REDIB), ProQuest, Scientific Electronic Library Online (SciELO), and Emerald Insight. The systematic approach to data collection and analysis is crucial for ensuring the robustness and reliability of the study's findings, contributing to the scholarly understanding of Lesson Study practices and their cultural implications on a global scale.

The second article, *Articulating the CCM Approach and Lesson Study: A Promising Teacher Professional Development Towards Inclusive Education* (Fluminhan *et al.*, 2022), was published in the *Video Journal of Social and Human Research* (ISSN: 2795-5745) in 2022 and is available at <https://vjshr.uabpt.uema.br/index.php/ojs/article/view/8>. This theoretical study examines the contemporary concept of inclusion by investigating international research literature on LS in inclusive settings and exploring the potential applicability of the CCM approach to establish improved conditions for inclusive education in conjunction with LS.

The third article, *Lesson Study Identity in the Brazilian Educational Context: A Scoping Review*, is currently in its draft and will be submitted to an international journal. This study aimed to map the available information regarding the main themes and issues that appear to be shaping the LS development in Brazil. This investigation followed the Joanna Briggs Institute's – JBI (Peters *et al.*, 2022) methodological structure. This framework consisted of the following main phases: design and search for relevant studies, selection of studies, charting of the data, and the collation, summarization, and reporting of the results. Data collection involved five national and international databases: CAPES Portal, Emerald Insight, Educational

Resources Information Center – ERIC, SCOPUS, and Scientific Electronic Library Online – SciELO. Data search was conducted in September and October 2023.

Following their nomenclature, scoping reviews effectively delineate the extent or comprehensiveness of a body of literature on a specific subject. They provide a lucid overview of the quantity of available literature and studies, offering a comprehensive or detailed insight into their focal points (Munn *et al.*, 2018). Scoping reviews prove highly valuable when a body of literature remains inadequately reviewed or possesses a complex and heterogeneous nature that doesn't lend itself well to a more targeted systematic review of the evidence. These reviews serve a dual purpose: not only can they be conducted to assess the worth and potential scope of a comprehensive systematic review, but they can also be undertaken as standalone endeavors. In this capacity, they succinctly communicate and distribute research findings, pinpoint research gaps, and provide recommendations for future research initiatives (Tricco *et al.*, 2016).

The fourth article, *Microteaching Lesson Study: Student Teachers Learning in Inclusive Perspectives*, is currently in its drafted version and will be submitted to an international journal. This qualitative exploratory study explores whether participation in MLS, underpinned by the CCM approach, fosters collaborative learning and practical experiences toward inclusive education for student teachers.

This empirical research was conducted from November 2022 to February 2023 in an undergraduate course titled "Media and Technologies Applied to Education." This course, a mandatory component of the Pedagogy program, was offered at a state university in the interior of São Paulo state, Brazil, with classes available in both afternoon and evening periods throughout one academic term. The total workload comprised approximately 45 hours.

During the inaugural session of the academic term, the researcher elucidated the principles of the LS methodology to the entire cohort comprising 66 student-teachers enrolled in the course, including the afternoon and the evening groups. Subsequently, the researcher and the subject teacher extended invitations to all student teachers for their active involvement in a research endeavor characterized by the microteaching¹ format. Comprehensive details about the research process were provided to the student teachers, ensuring they were apprised of all pertinent information concerning their participation in the study.

¹ "Micro-teaching is a teacher education process in which a trainee acts as teacher of a small teaching unit (usually lasting less than 20 minutes), for a small group of peers, to practice some teaching technique or illustrate the teaching of some concept. An important aspect of microteaching is the constructive feedback obtained from peers and the discussion of the improvements that can be made to their teaching technique." (Da Ponte, 2017, p. 3)

Following inquiries and discussions initiated by student teachers concerning the procedural aspects of the research, a contingent of 33 students opted to abstain from engaging in the MLS (Microteaching Lesson Study) methodology, expressing a preference for more traditional classroom methods. In these "traditional classes," the subject teacher recommended readings, and subsequent discussions were held in the following sessions. Additionally, these students preferred a traditional assessment test at the end of the term based on the readings and in-class discussions. Therefore, distinct activities were assigned to this cohort throughout the semester, diverging from the instructional trajectory followed by the LS groups.

Consequently, the LS participants, comprised of 33 student-teachers, actively engaged in the course mentioned above and attended either the afternoon or evening sessions. The student teachers formed 9 LS groups (see Table 3). The course consisted of nine sessions; three were conducted in person, and the remainder were delivered synchronously online. Each session lasted approximately four hours, and throughout, the subject teacher and researcher provided guidance and support. Various instruments and procedures were employed for data production. These included the researcher's field notes, observations, lesson planning records, Padlet participation, collaborative word clouds, written reflections from the researcher and student teachers, meeting recordings, and notes from knowledgeable others.

Table 3 – Organization of the Lesson Study (LS) groups participating in the research.

Period	Student-teachers enrolled			LS groups
Afternoon	25	Participated in the LS methodology	21	6 LS groups
		Declined participation in the LS methodology	4	
Evening	41	Participated in the LS methodology	12	3 LS groups
		Declined participation in the LS methodology	29	
Total	66	Participated in the LS methodology	33	9 LS groups
		Declined participation in the LS methodology	33	

Source: The author (2024).

All research lessons were conducted in face-to-face classroom settings. The LS methodology provided a robust framework with principles and procedures to enhance future teachers' professional learning during their initial training. This framework includes setting goals, developing hypotheses and objectives, collaboratively planning research lessons, conducting and observing these lessons, participating in post-lesson discussions, and sharing acquired knowledge.

Throughout the research process, rigorous ethical considerations were adhered to, and the study obtained approval from the Brazilian Research Ethics Committee, documented under the registration number CAAE: 61389822.1.0000.5402. Before the study started, all participants signed the Voluntary and Informed Consent Form.

A thematic analysis (Braun; Clarke, 2006) was conducted to identify the participants' perceptions of the object under investigation. A total of four thematic units emerged. The findings revealed that, beyond providing teaching experience, student teachers demonstrated enhanced teaching skills, ability to reframe original teaching concepts, enhanced collaborative learning, increased confidence and sense ownership of their work, higher levels of understanding of student needs and effective teaching strategies, and increased awareness of theory and practice integration and inclusivity. Participants' most common constraints are difficulties understanding the MLS process, lack of teaching experience, collaboration with peers, feelings of isolation, and unrealistic teaching contexts.

In conclusion, the final section, Final Thoughts and Perspectives, presents and discusses the results obtained in the four articles to provide the reader with a comprehensive understanding of the entire research and to draw implications for the educational context. I invite you to engage deeply with the material, and I hope it proves thought-provoking, enlightening, and inspiring for further scholarly dialogues.

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6 FIRST ARTICLE**INSIGHTS TOWARDS CULTURAL ASPECTS AND RELATED IMPACTS OF
LESSON STUDY PRACTICES: A SYSTEMATIC REVIEW**

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7 SECOND ARTICLE**ARTICULATING THE CCM APPROACH AND LESSON STUDY: A PROMISING
TEACHER PROFESSIONAL DEVELOPMENT TOWARDS INCLUSIVE
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8 THIRD ARTICLE

LESSON STUDY IDENTITY IN THE BRAZILIAN EDUCATIONAL CONTEXT: A SCOPING REVIEW

ABSTRACT

Background: Lesson Study (LS) was inaugurated in the Brazilian educational context over a decade ago and remains relatively new to this country. Despite the growing number of initiatives, there is still a lack of shared understanding of the factors that are shaping the LS identity in Brazil.

Purpose: This study reviews the available information on the principal themes and issues influencing the development of LS in Brazil. It discusses the main features and range of procedures established, the forms of knowledge and motivations developed, the reasons for using this practice, and the challenges and limitations reported in the experiences.

Methods: A literature review following the Joanna Briggs Institute method for scoping reviews (PRISMA-ScR) and a thematic analysis to synthesize findings were conducted. No limitations were placed on the design, publication year, or language of the studies included in the review. The IRaMuTeQ software was used to treat the data.

Results: Sixteen relevant articles generated six thematic classes: (1) Reflection and collaboration on pedagogical practices; (2) Planning for improved results; (3) Perceived impacts on teachers' practice; (4) Experience of an innovative formative process; (5) LS objectives and results; and (6) LS research implementation.

Conclusions: The study uncovered key insights into the Brazilian LS context, highlighting the following recommendations: i) Refinement of the research objective for greater specificity; ii) Explicit identification of the adopted LS model; iii) Inclusion of knowledgeable others or external advisors; iv) Transparent sharing of encountered challenges; v) Wider dissemination of LS study experiences and outcomes to reach a broader audience.

Contribution: This study highlights surface-level features and uncovers the main factors influencing the development of LS in Brazil.

Keywords: Lesson Study. Teacher Education. Professional Development. Collaborative Learning. Scoping Review.

1 INTRODUCTION

The nature of teaching demands that teachers engage in continuing career-long professional development, but particular needs and the ways in which they may be met will vary according to circumstance, personal and professional histories, and current dispositions (Day, 1999, p. 1)

Formative processes centered on teacher professional development have captivated researchers and educators due to their potential to instigate changes in educational processes across various systems and levels of instruction. Lesson Study (LS), representing an approach

to professional development focused on teaching practice and characterized by collaboration and reflection (Murata, 2011; Ponte *et al.*, 2014), has gained prominence in teacher education. LS has inspired numerous research and provided the foundation for teacher training initiatives in diverse educational contexts (Richit; Ponte; Tomkelski, 2019). As Ponte *et al.* (2016, p. 869) noted, these studies "occur within the school environment, with teachers playing a central role."

Originating in Japan in the early 20th century, LS constitutes one of the principal approaches to professional development promoted in that country (Fujii, 2014; Lewis, 2009) and has been widely acknowledged for its role in the continuous enhancement of Japanese instructional methods, as observed by researchers such as Lewis and Perry (2014), Stigler and Hiebert (1999), Yoshida (1999). According to Fujii (2014), global attention to LS surged in 1999 when scholars involved in the Third International Math and Science Study (TIMSS) disseminated ethnographic accounts of LS to a broader audience (Stigler; Hiebert, 1999). These researchers praised LS as a means to establish a robust knowledge foundation for teaching, enhancing both the teaching and learning processes (Stigler; Hiebert, 1999; Yoshida, 1999).

As Dudley (2013) stated, LS has proliferated in China, various parts of Asia, and the Pacific over the past century. Its implementation is observed in the United States, Canada, Europe, Africa, and the Middle East. There is a growing movement in Brazil to spread LS and research across all country regions. As a result of the expressive increase of interest in this practice, Brazilian researchers and educators promoted the International Seminar on Lesson Study in Mathematics Education (SILSEM). In its second edition in 2023, SILSEM (<https://www.even3.com.br/iisilsem/?lang=en>) aims to bring together national and international researchers to discuss LS in Mathematics teacher education and explore its potential to foster changes in teacher practices and student learning in Brazil and worldwide.

In contrast to countries where teachers' learning is integrated into daily school activities, a common practice observed in the Brazilian educational context is relying on workshops teachers opt to attend for professional development. Additionally, limited mechanisms to translate teachers' learning into classroom practices hinder collective capacity building. However, the sparse initiatives of LS in Brazil have shown positive outcomes, especially within an educational system marked by professional isolation (Richit; Ponte; Tomkelski, 2020).

The Study and Research Group on Mathematics Education and Technologies (GPEM@T) was established in 2011 to institutionalize research in Mathematics Education within the Mesoregion Grande Fronteira do MERCOSUL, encompassed by the Universidade Federal da Fronteira Sul (UFFS). The group's pioneering research has been characterized by

the planning phase that centers on articulating theory and practice so that research results inform and support the preparation of research lessons, tasks, and observation guides. One of the investigative fronts of this group has been investigating and implementing LS predominantly in the school setting under the participation and observation of all participating group members, including the participation of external advisors. At least half of the LS research developed by GEP@T occurs in partnership with local education departments, and the initiatives originate from research projects of master's and doctoral studies and institutional research.

While pioneering countries rely on LS as a process to improve education through teacher development, experiences in the Brazilian context have shown that efforts are still focused on making learning accessible to all as a social and educational right. In this distinct moral dimension, LS implementation has evidenced contributions to improving education, teacher training, and student learning outcomes. This reveals that this methodology has been successfully introduced to the Brazilian cultural context. In this way, reflection takes on a shared perspective and a critical space regarding elements of school culture.

Two identified reviews of literature focusing on LS in the Brazilian context were published recently. The first one, Oliveira, Hitotuzi, and Schwade (2021), aimed to identify how many and what type of academic production focused on the implementation of LS in Brazil between 2008 and 2018. The second one, Cardoso, Fialho, and Barreto (2023), analyzed how the LS approach, specifically for Mathematics, has been utilized in theses and dissertations in Brazil. Both reviews intended to reveal aspects related to the studies' principal features and to describe them. However, there has been a lack of review that explores LS's "personality" as it initiates its journey in the Brazilian context. To provide a comprehensive picture of LS identity in Brazil, this scoping review aims to map the available information regarding the main themes and issues that appear to be shaping the LS development in this country. The research questions were developed according to the PCC (population, concept, context) framework recommended by the Joanna Briggs Institute – JBI (Peters *et al.*, 2022). Thus, the following research questions (RQ) guided the development of this study:

RQ1: What are the main features and range of procedures researchers and educators have embraced when implementing LS in Brazil?

RQ2: What forms of knowledge and motivations do LS group members reveal to have developed due to this practice?

RQ3: What is LS for in the view of Brazilian researchers and educators?

RQ4: What are the reported challenges and limitations concerning the implementation of LS in Brazil?

This article is structured into five sections. The initial section serves as an introduction, providing an overview of the topic. The subsequent section delves into the theoretical framework. The "Method" section expounds on the methodological approaches applied in the research, while the "Results and Discussion" section comprehensively examines the research findings to answer all the research questions. Lastly, the concluding section, titled "Final Remarks," presents the conclusions, outlines its limitations, and provides insightful recommendations for future research endeavors.

2 LESSON STUDY: THEORETICAL FRAMEWORK

LS is a systematic process of instructional enhancement wherein teachers collaborate to establish goals for student learning and long-term development (Fujii, 2014). This collaborative effort involves the formulation of objectives, the creation of a 'research lesson' tailored to achieve these goals, and the implementation of the lesson in a classroom setting, with one team member taking on the role of the instructor while others observe and collect evidence on student learning and development (Takahashi; McDougal, 2016). Subsequently, these teachers engage in reflective discussions, analyzing the gathered evidence to enhance the lesson, the unit, and instructional strategies more broadly (Lewis, 2009). Optionally, the revised lesson may be taught, observed, and refined further in additional classrooms (Murata, 2011).

In Japan, LS is adaptable across all levels of the education system and is sponsored by diverse entities such as schools, teacher research circles, and professional organizations (Lewis, 2009). The purposes behind conducting LS vary, including curriculum improvement and fostering collaboration within schools (Chen; Yang, 2013; Dudley *et al.*, 2019; Lewis; Perry; Hurd, 2009). Nonetheless, the fundamental shared objective of any LS initiative is to enhance student learning by fostering teacher professional development (Willems; Van den Bossche, 2019).

According to Lewis, Perry, and Hurd (2004), educators involved in Lesson Study (LS) in Japan and the United States experienced seven key advantages. They deepened their subject knowledge, enhanced instructional understanding, refined student observation skills, built robust professional networks, linked daily practices with long-term objectives, boosted motivation and confidence, and improved the quality of lesson planning.

Despite the proclaimed benefits, engaging in LS demands considerable time and patience. Stigler and Hiebert (2016) argue that it is a gradual process that aims to achieve minor teaching enhancements over extended periods. This approach might not appeal to education systems seeking quick, immediate impacts like improved exam results (Cajkler *et al.*, 2015). Nevertheless, its adoption is increasing, with numerous research studies exploring its effectiveness in diverse contexts (Dudley, 2012; Murata, 2011). As the body of research supporting its advantages expands, the crucial investigation of how LS can meet the demands and be effectively implemented in schools worldwide emerges (Cajkler *et al.*, 2015).

3 METHOD

3.1 Scoping reviews

For this review, the JBI methodological framework (Peters *et al.*, 2022) was applied. This reporting guideline highlights the paramount significance of methodological rigor in scoping reviews. This framework consisted of the following main phases: design and search for relevant studies, selection of studies, charting of the data, and collation, summarization, and reporting of the results.

3.2 Search terms and search strategies

This review focused on investigating the identity of the LS methodology observed in the Brazilian educational context. Before the selection phase, two reviewers planned and developed the scoping review protocol to pre-define the objective, the research questions, and the search and selection method of potential evidence sources to be included in the final review report.

During September and October 2023, the databases CAPES Portal, which was accessed through the Federate Academic Community – CAFe; Emerald Insight, publisher of the International Lesson and Learning Studies Journal; Educational Resources Information Center (ERIC); SCOPUS; and Scientific Electronic Library Online (SciELO) were searched with no restrictions to the publication date. An initial orientation search was conducted to extract the key search terms. The search strings and filters used in the search strategies in each database and the number of publications obtained are described in Table 1.

Table 1 – Databases, filters, and search strings used in the search strategies and number of publications retrieved.

Databases / Filters	Search strings	Results
Portal CAPES <ul style="list-style-type: none"> Articles Peer reviewed 	(Título é (exato):"Estudo de aula" OU Título é (exato):"Estudos de aula") E Qualquer campo contém: Brasil	17
	Título é (exato): "Lesson Study" E Qualquer campo contém: Brasil	11
	(Título é (exato): "Estudio de clase" E Qualquer campo contém: Brasil	0
Emerald Insight <ul style="list-style-type: none"> No filters applied 	title:"Lesson Study" AND (Brazilian)	1
	title:"Lesson Study" AND (Brazil)	1
ERIC <ul style="list-style-type: none"> No filters applied 	"Lesson Study" AND "Brazil"	5
	"Lesson Study" AND "Brazilian"	2
SciELO <ul style="list-style-type: none"> No filters applied 	("Lesson Study") AND (Brazilian)	1
SCOPUS <ul style="list-style-type: none"> Articles 	(TITLE ("Lesson Study") AND ABS (brazil)) AND (LIMIT-TO (DOCTYPE , "ar"))	3
Total		41

Source: The author (2024).

3.4 Study selection criteria

Following the PCC framework, a four-stage process was used to identify selection criteria for study reviews. First, studies were required to focus on the participation of in-service or pre-service teachers (population). Second, empirical studies had to discuss the implementation of the LS methodology (concept). Third, studies had to be developed in the Brazilian educational setting (context). Fourth, only peer-reviewed articles would be of interest in the review process. No restrictions were imposed regarding the type of design, year, or language of publication for studies reviewed. The exclusion criteria were established: first, the study was not available in full; second, the LS concept needed to be clearly defined; and third, it needed to be an article document.

3.5 Study selection

Two reviewers independently evaluated each study using the abovementioned inclusion and exclusion criteria. By reading the title, abstract, and keywords, they recorded their evaluation as relevant (R), irrelevant (I), doubtful (D), or double (D). Based on the abstracts

retrieved from the search, the reviewers read the articles in full for study inclusion. When disagreements occurred, a third reviewer was consulted to determine final inclusion. All included citations were imported into the Zotero reference management software for subsequent data characterization of full articles.

3.6 Charting the data

This stage involved extracting data from included studies. The research team collectively developed the data-charting form to determine which variables to extract would help answer the research questions and reach the proposed objective. Charting was developed as an iterative process in which researchers continually updated and refined the data-charting form, as Piškur *et al.* (2012) recommended. This form provided descriptive entries (e.g., study design, objective) and specific narrative information (e.g., challenges, constraints). Two reviewers independently charted the data and discussed the results.

3.7 Collating, summarizing, and reporting the results

The data compilation and synthesis process followed a two-step approach, following established methodological protocols outlined in the literature (Levac; Colquhoun; O'Brien, 2010; Peters *et al.*, 2022). Each study was meticulously summarized descriptively, encompassing key components such as citation details, research objectives, study methodology, participant demographics, main findings, and encountered challenges or limitations, as delineated in Table 2. Furthermore, a narrative synthesis methodology was employed to amalgamate insights using the *Interface de R pour les Analyses Multidimensionnelles de Textes et de Questionnaires* (IRaMuTeQ) version 0.7 alpha 2 software as a tool to provide data treatment from the texts of the articles' abstracts, keywords, and authors. The software's main objective is to synthesize the structure and organization of discourse, making it possible to identify the relationships between lexical words that occur most frequently in the textual corpus (Camargo; Justo, 2013).

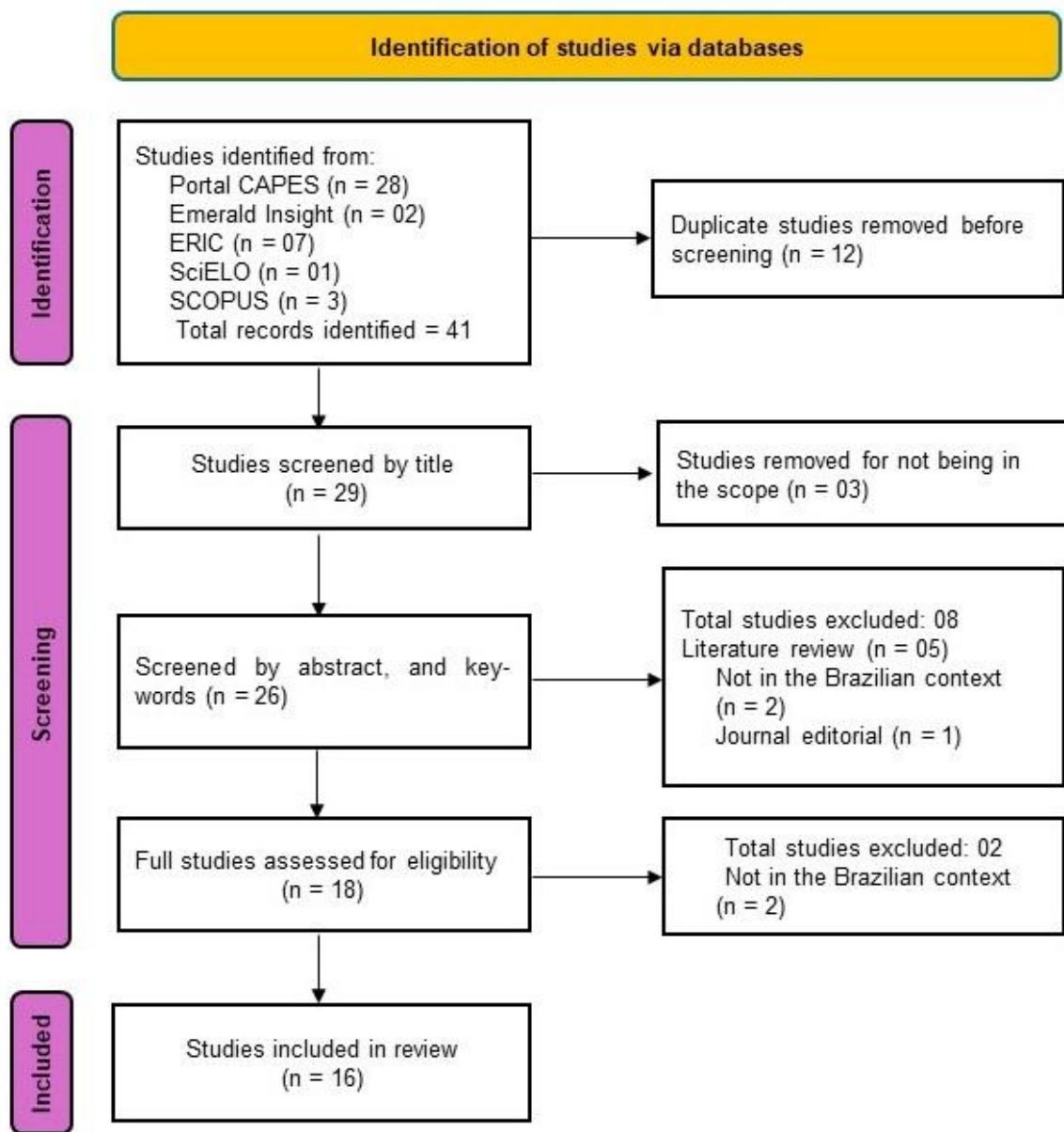
Four textual analyses were conducted: (1) Word Cloud, used to group and graphically organize words based on their relevance, with bigger words indicating higher frequency, considering words with a frequency equal to or greater than three; (2) Classical Lexicographic Analyses to examine the statistical quantity of text segments (TS), evocations, and forms; (3) Descending Hierarchical Classification (DHC) to recognize the dendrogram with emerging

classes, in which a higher χ^2 value indicates a stronger association between the word and the class; words with $\chi^2 < 3.80$ ($p < 0.05$) were disregarded; (4) Similarity Analysis, allowing the identification of occurrences between words and providing insights into word connectivity.

4 RESULTS AND DISCUSSION

The PRISMA-ScR (PRISMA extension for Scoping Reviews) flow diagram (Page *et al.*, 2021) is presented in Figure 1. A total of 41 records were identified and reduced to 29 articles after duplicates were removed. The first screening of the articles was derived from a title analysis, excluding those that did not focus on implementing the LS methodology. This step reduced the sample to 26 articles, further analyzed through abstract and keyword reading. At this stage, eight studies were excluded because they were literature reviews ($n = 05$), the studies were not implemented in the Brazilian educational setting ($n = 02$), or consisted of journal editorial ($n = 01$). The full-text reading of the remaining 18 articles resulted in two being excluded from the sample because they were found to be implemented outside the Brazilian context. Thus, the final total comprised 16 articles relevant to charting.

Figure 1 - PRISMA–ScR Flow Diagram for the scoping review process.



Source: The author (2024).

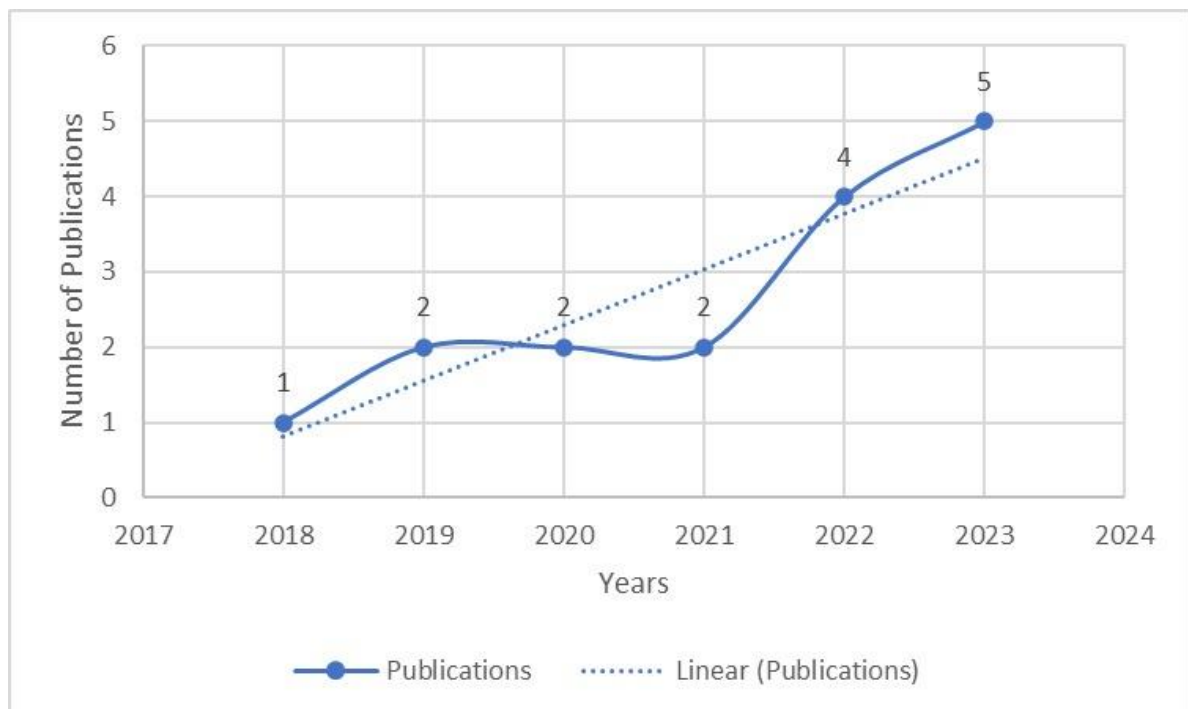
PRISMA = Preferred Reporting Items for Systematic Reviews and Meta-Analyses.

PRISMA-ScR = PRISMA extension for Scoping Reviews (Tricco *et al.*, 2018).

The trend in the number of publications on LS in the Brazilian context shows an increasing interest in the subject (see Figure 2). Even though the first scientific publication in Brazil occurred through Magalhães' master's dissertation in 2008 (Magalhães, 2008), this review retrieved articles only from 2018 onwards. Published articles more than doubled in number in the past five years, from 2 papers published in 2019 to 5 papers up to October 2023. It is noticeable that LS is still in its infancy in terms of implementation and practice in Brazil

(Oliveira; Hitotuzi; Schwade, 2021; Richit; Ponte, 2020). This factor has implications for how LS is viewed and implemented in this country. The urgency for a deeper understanding of the theory or theories that underpin LS and key elements that sustain its practice is evident. There have been initial debates, and to the present, no public policy supports a program that uses this method in public education.

Figure 2. Time evolution of the publications in the corpus.



Source: The author (2024).

4.1 Descriptive summary of the studies

This section aims to answer the following research question: RQ1. What are the main features and range of procedures researchers and educators have embraced when implementing LS in Brazil?

The majority of the 16 selected articles ($n = 10$) were published in Portuguese and adopted the translated version “*Estudo de Aula*,” consistent with the terminology used by the Portuguese researchers (Table 2). However, it is noteworthy that the SILSEM event, conceptualized and coordinated by Brazilian researchers, opted for “Lesson Study” even on its Portuguese-language website, ensuring uniformity in terminology within the international academic context.

All the selected articles consisted of qualitative studies involving a researcher or a group of researchers who conducted the LS process. Macedo, Bellemain, and Winsløw (2019), Richit, Ponte, and Richit (2022), and Rodrigues, Santos, and Arroio (2020) conducted studies employing mixed groups of student teachers and in-service teachers to implement the LS process. In contrast, the remaining 13 studies concentrated on developing this approach specifically with in-service teachers.

LS was implemented across various educational levels, spanning from preschool ($n = 3$) to elementary school ($n = 6$), high school ($n = 5$), and higher education ($n = 3$). Additionally, two studies indicated the utilization of LS in Basic Education, which encompasses preschool, elementary, and high school levels in Brazil. Aligning with international trends (Baumfield *et al.*, 2022; Kanellopoulou; Darra, 2019), LS predominantly found application in the field of mathematical education ($n = 12$), with fewer instances in physics ($n = 2$), science, didactics, technology, computational thinking skills, and inclusive education, each represented by a single study. Some studies engaged in LS activities in more than one school phase and curriculum area.

Each selected study provides insights into the LS framework, often with significant detail. However, there is considerable variability concerning other theoretical frameworks to support the investigations. These frameworks were primarily employed to guide the implementation of LS, conduct data analysis, or sometimes both. In six articles (37.5%), there was no reference to any other theoretical framework, whereas the remaining ten studies exhibit a distinct theoretical orientation, particularly in the implementation of LS. For instance, Oliveira *et al.* (2023) delved into using teaching methodologies within an inclusive framework grounded in the Universal Design for Learning (UDL). Richit, Hurtado, and Silva (2022) explored concepts of reflection in, on, and for teaching. In their study, Tomkelski and Baptista (2023) examined the nuances of Pedagogical Content Knowledge (PCK) and Multiple Representations. Additionally, Schuhmacher, Slomp, and Schuhmacher (2022) investigated the concept of Computational Thinking within the context of LS implementation.

Table 2 - Descriptive summary of the relevant studies.

Author/year/language of publication	Aim of the study	Context and design/duration	School Phase/ Curriculum area	Description of the study population	Theoretical Framework (other than LS)	Key findings	Main challenges
1. Batista, Paulo (2023) Portuguese	Explain the learning experiences of mathematics teachers who engaged in analyzing lessons that covered triangle concepts using the GeoGebra software	Qualitative Phenomenological perspective Analysis of the 6th and final LS cycle Duration: 2 months	High school / Mathematics	LS group: 3 high school teachers	Not explicit	<p>There was engagement from the teachers in teaching the content.</p> <p>Communication: adopting an inquisitive approach that encourages students to reflect on what is being done and to seek answers through their exploratory efforts.</p> <p>Knowledge of their own practice: "allowing time" for the students to engage with the explorations, persisting in the search for answers. Mistakes are important for learning.</p> <p>Lesson Study is a practice in which there is the opportunity to be with the educator, providing them with</p>	Despite the desire for change due to multiple reasons, the teacher does not modify their teaching methods. A shift in practice occurs solely through a personal decision, driving them towards this goal despite the challenges they may encounter.

Author/year/language of publication	Aim of the study	Context and design/ duration	School Phase/ Curriculum area	Description of the study population	Theoretical Framework (other than LS)	Key findings	Main challenges
						the necessary support to change their practice if they wish to do so.	
2. Macedo, Bellemain, Winsløw (2019) English	Experiment with ideas from didactical engineering (DE) in student teachers' first experience with lesson study (LS)	Qualitative Case Study of ST Analysis of the first lesson taught the post-lesson reflection and how DE methodology was applied. Duration: 1 academic semester	Engineering undergraduate course / Mathematics	A mixed group of prospective and in-service teachers: 4 student teachers (ST) the teacher supervisor, 1 teacher educator, 1 researcher Students: 30 middle-school students	Didactical engineering (DE) (Artigue, 1994)	Elements from DE can enhance LS in pre-service education. ST realized the necessity of studying the contents as a prerequisite to design creative lessons that are significantly more ambitious than the teaching they experienced in school.	The failure of the ST to produce a reasonably explicit lesson plan. During the reflection meeting, one of the observing STs pointed out the difficulty of evaluating the pupils' learning in the research lesson.
3. Müller, Quartieri (2023) Portuguese	Investigate the potentialities of the Lesson Study methodology in professional development	Qualitative Intervention 4 cycles of LS using technological resources and experimental activities with a focus on reflection Duration: not explicit	Pre-school and elementary school / Mathematics and Science	LS group: 2 Pre-school teachers 2 elementary school teachers	Not explicit	LS assisted in teachers' conceptual gaps, encouraged investigative and collaborative approaches, and fostered communication and reflection, research in the classroom, and students' learning	Not reported

Author/year/language of publication	Aim of the study	Context and design/duration	School Phase/ Curriculum area	Description of the study population	Theoretical Framework (other than LS)	Key findings	Main challenges
4. Oliveira, Bracken, Nakano, Dart (2023) English	Describe the preparation phases of Lesson Study on the use of teaching methodologies with an inclusive perspective in higher education	Qualitative Exploratory Descriptive Resources and strategies indicated by the teachers during 1 cycle of LS with a focus on planning Duration: not explicit	Higher Education / Teaching and learning methodologies with an inclusive perspective	LS group: 2 higher-education professors teaching courses related to Special Education and Inclusive Education Students: 12 undergraduates, 4 of whom presented some type of social marker	Universal Design for Learning (UDL) (Hanesworth; Bracken & Elkington, 2019)	Increased the understanding of inclusive education, facilitated knowledge and resource sharing, supported the development of strategies to enhance the teaching-learning process, and teachers engaged in joint decision-making processes	Time constraints, planning, and limited opportunities for professional development
5. Pereira, Melo (2021) Portuguese	Advocate for the potentials and limits of LS as a possibility for continuous professional development	Qualitative Case Study 1 cycle of LS with a focus on reflection Duration: 1 academic semester	Elementary School / Mathematics	LS group: 2 first-year teachers, 1 pedagogical coordinator, 1 researcher Students: 1 group of first-year students	Not explicit	Teachers revised their knowledge of specific content related to length measurements. Teachers felt motivated when presented with alternative teaching methods	Not reported
6. Richit, Hurtado, Silva (2022) English	Analyze the reflection on teaching mobilized in a lesson study that involved	Qualitative Interpretative 1 cycle of LS and 2 research lessons	Elementary school/ Mathematics	LS group: 8 teachers	Concept of reflection (Perrenoud, 2002; Schön, 1983)	Teachers reflected and developed an understanding of how to address students' learning difficulties	Not reported

Author/year/language of publication	Aim of the study	Context and design/duration	School Phase/ Curriculum area	Description of the study population	Theoretical Framework (other than LS)	Key findings	Main challenges
	mathematics teachers	with a focus on reflection Duration: not explicit					
7. Richit, Ponte, Richit (2022) Portuguese	Highlight and discuss the professional knowledge employed in a lesson study of Calculus conducted with university professors who teach in Mathematics education programs	Qualitative Interpretative One cycle of LS with a focus on reflection Duration: 1 academic semester	Higher Education / Mathematics	A mixed group of prospective and in-service teachers: 8 higher education professors 1 undergraduate mathematics student	Professional knowledge Shulman (1986, 1987)	Teachers were able to investigate aspects associated with the content being taught that could impact the teaching process, such as understanding the common challenges students face in this topic, considering the students' real-life situations, assessing their familiarity with open-ended tasks, and evaluating the relevance of the teaching tasks to the student's everyday experiences	Not reported
8. Richit, Ponte, Tomasi (2021) English	Examine aspects of professional collaboration in a lesson study conducted with mathematics teachers from the final years of basic education belonging to	Qualitative One cycle of LS with a focus on collaboration Duration: 1 academic semester	Basic School / Mathematics	LS group: 8 Mathematics graduates	Not explicit	LS enhanced basic aspects of collaboration, namely mutual encouragement and support, cooperation, and shared reflection	The main challenge throughout this process was overcoming individualism because participant teachers' professional

Author/year/language of publication	Aim of the study	Context and design/duration	School Phase/ Curriculum area	Description of the study population	Theoretical Framework (other than LS)	Key findings	Main challenges
	public schools in the State of Rio Grande do Sul, Brazil						routine was marked by isolation.
9. Richit, Ponte, Tomkelski (2020) Portuguese	Examine the process of development of professional collaboration in a lesson study	Qualitative Interpretative Analytical 1 cycle of LS with a focus on collaboration Duration: 1 academic semester	Elementary school / Mathematics	LS group: 6 elementary school teachers Students: a group of year-4 students	Professional collaboration (Hargreaves, 1998)	LS promoted professional collaboration, strengthened trust among peers, and facilitated professional learning.	Cultural specificities in Brazil include extensive working hours for teachers and a heavy workload.
10. Richti, Ponte, Tomkelski (2019) Portuguese	Identify challenges and adaptations of this formative process and its potential to promote teacher professional development	Interpretative Analytical Qualitative 3 groups of LS participated in 1 the same LS cycle, including 3 research lessons. Duration: 2 academic semesters	High school / Mathematics	LS group: 17 high school teachers	Not explicit	LS provided the opportunity to revisit and deepen teachers' knowledge associated with mathematics teaching from a perspective different from the usual, characterized by isolation and individualism. Teachers developed collaboration and engagement toward the LS process	The development of a different practice; the ability to negotiate pedagogically with colleagues and students, such as exchanging schedules with other teachers and negotiating with the students for the implementation of the research lesson; lesson planning based on the students'

Author/year/language of publication	Aim of the study	Context and design/ duration	School Phase/ Curriculum area	Description of the study population	Theoretical Framework (other than LS)	Key findings	Main challenges
							difficulties and needs; and the possibility of transcending the tradition of predominant actions associated with teacher training.
11. Richit, Tomkelski (2022) English	Explore the meanings of mathematics teaching formed in the reflection promoted in a lesson study	Qualitative Exploratory study Interpretative 4 cycles of LS with a focus on reflection Duration: 4 years	Approx. 30 teachers of Elementary, middle, and high school / Mathematics	LS group: Approximately 30 teachers	Concept of teaching (Isabel Alarcão, 2018)	The study revealed that mathematics teaching involves various meanings, including educational action, social commitment, and pedagogical transformation	Participants were not familiar with LS. For this reason, reflections appeared more timidly at the beginning of the process and became more developed in the second half of the cycle.
12. Rodrigues, Santos, Arroio (2020) Portuguese	Explore the research question: How to contextualize the teaching of Physics and ignite students' interest in the subject?	Qualitative A mixed group of prospective and in-service teachers. 3 LS cycles for each team with a focus on reflection Duration: 1 year	High school / Physics	2 mixed groups of prospective and in-service teachers: Group 1: 1 Researcher, 2 Physics teachers, 4 Physics undergraduates Group 2:	Community of practice (Lave & Wenger, 1991; Wenger (2008)	Teachers benefited from collaboration to plan activities, discuss and solve problems, swiftly exchange information and innovative ideas, and develop interpersonal relationships and shared identities	Not reported

Author/year/language of publication	Aim of the study	Context and design/duration	School Phase/ Curriculum area	Description of the study population	Theoretical Framework (other than LS)	Key findings	Main challenges
				1 Researcher, 6 high school Physics teachers 5 Physics undergraduates			
13. Schuhmacher, Slomp, Schuhmacher (2022) Portuguese	Develop a sequence that uses the skills of Computational Thinking, which involves the development of reasoning and computational logic, to learn about Ecology and to present the potential of Lesson Study as a professional development process and the methodology used	Qualitative Phenomenological perspective One cycle of LS with a focus on reflection	Elementary School / Computational Thinking (CT) Skills and Ecology	LS group: 4 teachers who teach subjects related to Ecology	Computational Thinking (Jeannete Wing, 2006)	Participants developed strategies that helped the students' reasoning processes. The didactic sequence demonstrated the teachers' understanding of the use of CT skills to approach the Ecology theme	Not reported
14. Silva, Curi (2018) Portuguese	Analyze the process of investigating one's teaching practice through a LS cycle conducted by a 1st-grade elementary school teacher	Qualitative Interpretative One cycle of LS Duration: not explicit	Elementary School / Mathematics	LS group: 2 first-grade teachers of elementary school 1 researcher Students: 6 first-grade students	Not explicit	Revealed conflicts and misunderstandings between what was planned and executed, as well as reflexive manifestations of the teacher about her performance when teaching the research lesson	Not reported

Author/year/language of publication	Aim of the study	Context and design/duration	School Phase/ Curriculum area	Description of the study population	Theoretical Framework (other than LS)	Key findings	Main challenges
15. Tomkelski, Baptista (2023) Portuguese	Present the pedagogical content knowledge developed by Physics teachers regarding the use of multiple representations (MRs) in teaching Ohm's Law when engaged in a lesson study	Qualitative One cycle of LS developed in 18 sessions of 2,5 hours each with a focus on reflection Duration: not explicit	High school / Physics	LS group: 4 Physics high school teachers	Pedagogical Content Knowledge - PCK (Shulman, 1987) Multiple Representations (Ainsworth, 1999, 2006, 2008)	Data analysis revealed that emphasizing MRs enhances the teaching of the topic by providing complementary information, facilitating restricted interpretations, and fostering deep understanding.	Not reported
16. Tomkelski, Baptista, Richit (2023) English	Analyze teachers' learning on the use of multiple representations (MRs) in the teaching of Ohm's law, examining them in a lesson study	Qualitative One cycle of LS developed in 18 sessions of 2,5 hours each with a focus on reflection Duration: not explicit	High school / Physics	LS group: 4 Physics high school teachers	Multiple Representations (Ainsworth, 1999, 2006, 2008)	Teachers learned about the functions of MRs and their possibilities, as well as how to use those functions in planning activities on Ohm's law (PCK). They understood how and why students use those functions in their learning and the potential of activities to foster learning.	Not reported

Source: The author (2024).

that LS was introduced in the Western world by mathematics specialists explains this trend. Mathematicians are the researchers who most investigate LS as a teaching development method in Brazil and who, as a consequence, lead important events in the country.

In the third word cloud (Figure 3c), the studies frequently cite Ponte as the primary author, with subsequent mentions of Richit, Lewis, Baptista, Tomkelski, and Quaresma. Notably, except for Lewis, all these researchers publish in English and Portuguese and are distinguished academics. Lewis stands out as one of the prominent researchers credited with introducing LS in the English language beyond Japan. Nevertheless, Dudley, acknowledged as a key figure in this area (Oliveira *et al.*, 2023), along with Yoshida, Fujii, Cajkler, Stigler, Hiebert, Murata, Nakano, and Fernandez, also serve as international authorities, establishing foundational principles, characteristics, and insights related to LS. Despite producing substantial reference materials in the field, they seem almost ignored in the Brazilian LS movement.

Deviating from authoritative sources poses the risk of misconstruing fundamental LS concepts. For instance, Rodrigues, Santos, and Arroio (2020) indicate that in the traditional LS method, an experienced teacher designs the research lesson while other participants replicate it, often more rigidly. When an assertion lacks proper referencing and is not thoroughly discussed, it might lead one to misconstrue LS as a non-collaborative and top-down approach, contrary to its actual nature. As outstanding international scholars were not deeply involved in discussions of various studies, a question is whether the language barrier might be considered an obstacle for the Brazilian scientific community.

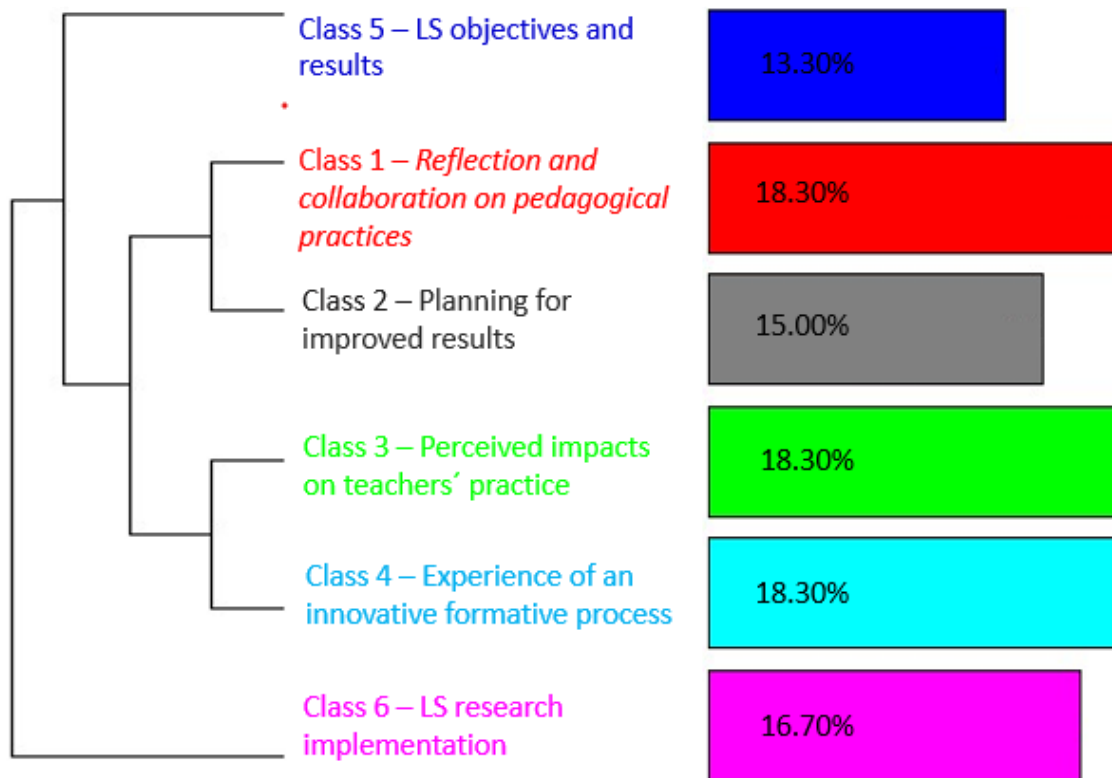
4.2.2 Classic Lexicographic Analysis and Descending Hierarchical Classification

To extract a comprehensive picture of Lesson Study identity in Brazil, a general corpus consisting of 16 texts (Ts) was generated, using 65 text segments (TSs) (92.31%). The analysis was performed on the abstracts of the included studies. A total of 2.383 occurrences (words, forms, or vocabulary) emerged, with 548 distinct words and 416 with a single occurrence.

The dendrogram of the clusters obtained with IRaMuTeQ (Figure 4) categorized the content into six Classes. One branch includes Classes 1 to 5, whereas Class 6 belongs to a single branch. Class presentations will follow the order in which they originated, i.e., class 6, 5, 1, 2, 3, and 4. In this section, the numbers shown after the excerpts correspond to the articles presented in Table 2. The percentage of words in the abstracts associated with each class is demonstrated in the respective bar. The analysis of the semantic fields in each class identified

in the dendrogram suggests the following categorization of the studies developed in the select articles.

Figure 4. Dendrogram with the organization of classes based on the Descending Hierarchical Classification (CHD).



Source: Prepared by the author (2024). Created with IRaMuTeQ.

This class represents 16.67% ($f = 10$ TSs) of the total analyzed corpus, comprising words and radicals ranging between “qualitative” ($x^2 = 4.70$) and “interview” ($x^2 = 39.62$). This category includes words such as “observation” ($x^2 = 5.68$), “cycle” ($x^2 = 5.68$), “empirical” ($x^2 = 21.43$), and “session” ($x^2 = 33.33$). Class 6 is related to the procedures of LS implementation. Relevance is given to the methodology and qualitative data analysis employed. The empirical material of studies consisted of researchers’ field notes (3, 6, 8, 10, 11), interviews (5, 6, 8, 9, 11, 15, 16), meeting recordings (3, 9), research class observations (5), participants’ logbooks (6), and students’ written registers produced during research lesson (16).

The participants worked collaboratively to plan a lesson about this topic. The methodology is qualitative and interpretative, with data collected by audio records of the planning sessions for the lesson and field notes, conversations, and interviews carried out with participating teachers (Article 10).

The empirical material of the study consists of the transcriptions of the audio recordings of the lesson study sessions, interviews with the teachers at the end of the process, and students' written registers produced during class (Article 16).

Class 5 – LS objectives and results

The findings from Class 5, which represents 13.33% ($f = 8$ TSs) of the total analyzed corpus, are significant. The category includes words such as “effective” ($x_2 = 7.77$), “participate” ($x_2 = 7.77$), “concept” ($x_2 = 14.10$), and “teach” ($x_2 = 7.92$). These words are key to understanding the objectives and the results reported, which will be detailed in the subsequent classes.

Considering the complexities of MRs [multiple representations], the teachers examined the information accessible to students and how they can use it, encouraging them to find effective ways to integrate MRs to support the learning process (Article 15).

The results show that the participants are involved in the development of strategies that help the students' reasoning processes, and the didactic sequence demonstrates the experience and the teachers' understanding about the use of PC skills in the construction of the Ecology theme (Article 13).

To extract valuable insights from LS initiatives, it is essential to understand their objectives, specifically the intended outcomes for the advancement of future educators. Similar to the review conducted by Da Ponte (2017), the selected studies did not often state their goals clearly or made them too broad in some cases, making it necessary to infer from the research design and outcomes. Considering this, it was possible to note that developing pedagogical content knowledge (PCK) was the aim of three studies (13, 15, 16). Only one study (1) focused on content knowledge (CK) as the main research issue. The remaining 12 studies indicated pedagogical knowledge (PK) as the main goal of their research. Interestingly, some studies that focused on PK revealed that teachers benefited from improving their CK (5, 6, 10) or became more aware that, to design better lessons, teachers need to study the contents to be taught (2). In other words, they modified each by reflecting on the other. This finding aligns with Da Ponte's review (2017), which observed that previous research on LS primarily focused on participants' pedagogical development, overlooking its role in enhancing their comprehension of the subject matter.

Several studies indicated significant outcomes: teachers demonstrated substantial learning in engaging in stronger collegiality practices (1, 4, 8, 9, 10, 12), improving their observation of students' learning processes (1, 6, 7, 13,16), enhancing their ability to reflect on

lessons (3, 5, 10), deepening knowledge on teaching practice (1, 13), and elaborating subject matter (1,6). These results corroborate a vast body of literature relating to LS benefits. LS has been found to foster collaboration (Takahashi; McDougal, 2016), enhance teachers' comprehension of students' needs (Cajkler *et al.*, 2014), develop their practice knowledge (Dudley, 2014), and improve their ability to reflect and develop content knowledge (Schipper *et al.*, 2020). Nevertheless, it is important to highlight that although enhancing student learning stands as the ultimate objective of LS (Lewis; Perry; Hurd, 2009; Willems; Van den Bossche, 2019), most reviewed studies did not report what impacts (if any) were observed on their student's achievement.

A single study (2) highlighted that student learning observation posed a challenge. The study emphasized the necessity of a well-structured lesson plan that clearly defines the intended knowledge and objectives concerning student learning and added that these specifications are crucial for targeted observation and reflection following the research lesson. Examining students' learning evidence would be valuable. This approach can provide validation of whether the objectives, methodological approach, and results perceived by teachers align with students' learning outcomes.

Class 1 – Reflection and collaboration on pedagogical practices

This class represents 18.33% ($f = 11$ TSs) of the total analyzed corpus, comprising words and radicals ranging between “guide” ($x^2 = 4.93$) and “reflection” ($x^2 = 16.52$). This category includes words such as “reflection” ($x^2 = 16.52$), “qualitative” ($x^2 = 13.91$), “mathematics” ($x^2 = 11.80$), “analysis” ($x^2 = 10.05$), and “collaboration” ($x^2 = 6.32$). This class highlights one of the most important benefits of LS, i.e., to promote shared reflections.

The qualitative analysis showed that the approach and dynamics of lesson study mobilized and deepened professional knowledge regarding mathematics, mathematics didactics, and the mission of the trainer of future mathematics teachers (Article 7).

The qualitative and interpretative analysis showed that the dynamics of the lesson study enhanced several basic aspects of collaboration, namely mutual encouragement and support, cooperation and shared reflection (Article 8).

Collaborative activities involving the sharing and critical reflection on teaching and learning practices among educators are regarded as key elements contributing to teachers' professional development (Aas, 2021; Akiba *et al.*, 2019; Stigler; Hiebert, 2016). Consistent with this characteristic, two articles investigated collaboration as a predominant feature (8, 9),

and others pointed it out as an outcome (3, 8, 9, 10, 12). For example, an emphasis on collaboration and reflection may be traced in the study conducted by Richit, Ponte, and Tomasi (2021). The authors explored various aspects of professional collaboration within a group of eight mathematics teachers of basic education. A distinctive discussion was proposed for the concept of “cooperation” and how it relates to “collaboration”. It is argued that “cooperation characterizes the first step towards collaboration, where participants become part of the process, take on a degree of responsibility, and perform a task” (Richit; Ponte; Tomasi, 2021, p. 3). The cycle lasted one semester and resulted in positive outcomes, such as encouragement, support, cooperation, and shared reflection.

Class 2 – Planning for improved results

This class represents 15.00% ($f = 9$ TSs) of the total analyzed corpus, comprising words and radicals ranging between “be” ($x^2 = 4.12$) and “plan” ($x^2 = 16.33$). This category includes words such as “plan” ($x^2 = 16.33$), “discussion” ($x^2 = 6,61$), “group” ($x^2 = 13.96$), and “research” ($x^2 = 7.66$).

[...] the results show that conducting this lesson study has led participants to modify their professional practice on aspects such as lesson planning, collective work, and negotiation of decisions and activities (Article 10).

The movement of planning, execution, and analysis of the mathematics class proposed by the Lesson Study, showed to be effective in revealing conflicts and misunderstandings between what was planned and executed, as well as reflexive manifestations of the teacher about their performance (Article 7).

In the study conducted by Silva and Curi (2018), the aim was to analyze the process of investigating one's own teaching practice through an LS cycle in a group composed of 2 elementary school teachers and one researcher. The process of planning, executing, and analyzing mathematics lessons through LS has proven effective in uncovering contradictions and misunderstandings between what was planned and its actual implementation, as well as reflective insights from teachers regarding their teaching practices. authors emphasized that, in the reflection stage, the LS methodology aims to discuss the importance of lesson planning theoretically and practically. This discussion is not meant to enforce a rigid format or constrain teaching practices but rather to organize and anticipate actions to teach and develop content in a contextualized, meaningful, and critical manner.

Adjustments in the planning phase and the research lesson led to collaboration in the study proposed by Richit, Ponte, and Tomkelski (2019). A distinctive feature of this study was that 17 high school teachers formed three groups of LS. However, they all participated in the same LS cycle, including three research lessons during two academic semesters. The authors claim that LS offered a chance for teachers to revisit and enhance their understanding of mathematics education from an unconventional perspective. This approach diverges from the typical isolated and individualistic teaching methods.

Class 3 – Perceived impacts on teachers' practice

This class represents 18.33% ($f = 11$ TSs) of the total analyzed corpus, comprising words and radicals ranging between “construction” ($x^2 = 4.93$) and “participation” ($x^2 = 14.07$). This category includes words such as “participation” ($x^2 = 14.07$), “process” ($x^2 = 10.05$), “result” (6.18), “formative” ($x^2 = 4.93$), “strategy” (4.93), and “experience” ($x^2 = 4.93$).

The study concluded that the opportunity to research in a university context increased the understanding of inclusive education among the involved agents (Article 4). Finally, based on the results obtained, it allowed us to observe the need that exists among teachers to improve their knowledge in the content of length measures and was able to share, through continuing education, difficulties and understanding of the content worked in the formative process - length measurements in the Early Years (Article 5).

As mentioned in Class 5 (LS objectives and results), various positive impacts were proclaimed in the reviewed articles. However, as international policy guidelines progress toward building more inclusive education, teachers face challenges regarding their knowledge, skills, and confidence in embracing inclusive teaching methods (UNESCO, 2009). In this sense, it is noteworthy that only one study (Oliveira *et al.*, 2023) investigated LS concerning teaching methodologies with an inclusive perspective. Two university professors and 12 undergraduates, 4 of whom presented some type of social marker, participated in the study. The authors indicated that this initiative promoted increased understanding of inclusive education, facilitated knowledge and resource sharing, supported the development of strategies to enhance the teaching-learning process, and teachers engaged in joint decision-making processes.

As noted by Fluminhan *et al.* (2022), LS inherently embodies a diverse, equitable, and inclusive instructional approach, aligning with the principles of inclusive education and the Constructionist, Contextualized, and Meaningful approach (CCM) (Schlünzen *et al.*, 2020). In

this context, the authors argue that “this interconnectedness is not only suitable but serves as a driver to overcome the challenge of promoting a school for all and equipping teachers with sustainable professional development to support them in diverse teaching contexts” (Fluminhan *et al.*, 2022, p. 92).

Class 4 – Experience of an innovative formative practice

This class represents 18.33% ($f = 11$ TSs) of the total analyzed corpus, comprising words and radicals ranging between “way” ($x^2 = 4.47$) and “development” ($x^2 = 21.40$). This category includes words such as “development” ($x^2 = 21.40$); “potential” ($x^2 = 19.09$); “professional” ($x^2 = 16.03$); education ($x^2 = 11.80$); “train” ($x^2 = 6.32$); and “practice” ($x^2 = 6.62$).

It is noteworthy that the teachers evaluated the methodology as productive for the improvement of pedagogical practices. The research showed that the training helped in the conceptual gaps of the teachers, being promising for their professional development, as it instigates investigative and collaborative postures, and encourages reflection and research in class and student learning (Article 3).

In this work, we analyze the nature of the reflection of teachers participating in a lesson study and how this act of thinking about the planning of a lesson can promote a new practice from the investigation class, favoring their personal and professional growth, metamorphosing their practice, and valuing them professionally (Article 6).

The experience indicates the possibility of encouraging the professional development of teachers because they are being offered a professional education and being encouraged to experiment with a different professional practice, particularly during the research lesson (Article 10).

In an exploratory interpretative study, Richit and Tomelski (2022) investigated the meanings of mathematics teaching formed in the reflection promoted in LS. During four years, they developed four cycles of LS, including 30 teachers. The planning of a different practice, the research lesson, allowed participants to experiment with math teaching, using different strategies and perspectives from those used in schools. Additionally, the reflection conducted at all stages of LS, especially on the objectives and purposes that guide daily math teaching, helped reveal teaching’s most intrinsic meaning: teaching as an educational act committed to students’ learning and development. This finding implies that the participants lacked familiarity with LS initially. Consequently, their reflections during the early stages of the process were hesitant and cautious. However, as the cycle progressed, particularly in the second half,

participants became more accustomed to LS, leading to more elaborate and well-developed reflections.

Also, in the study conducted by Macedo, Bellemain, and Winslow (2019), the innovation of integrating LS with ideas from didactical engineering in the initial experiences of student teachers evolved positive results. The participants, a combination of prospective and in-service teachers, recognized the importance of studying content thoroughly as a prerequisite to designing creative lessons significantly more ambitious than the teaching methods they encountered in schools.

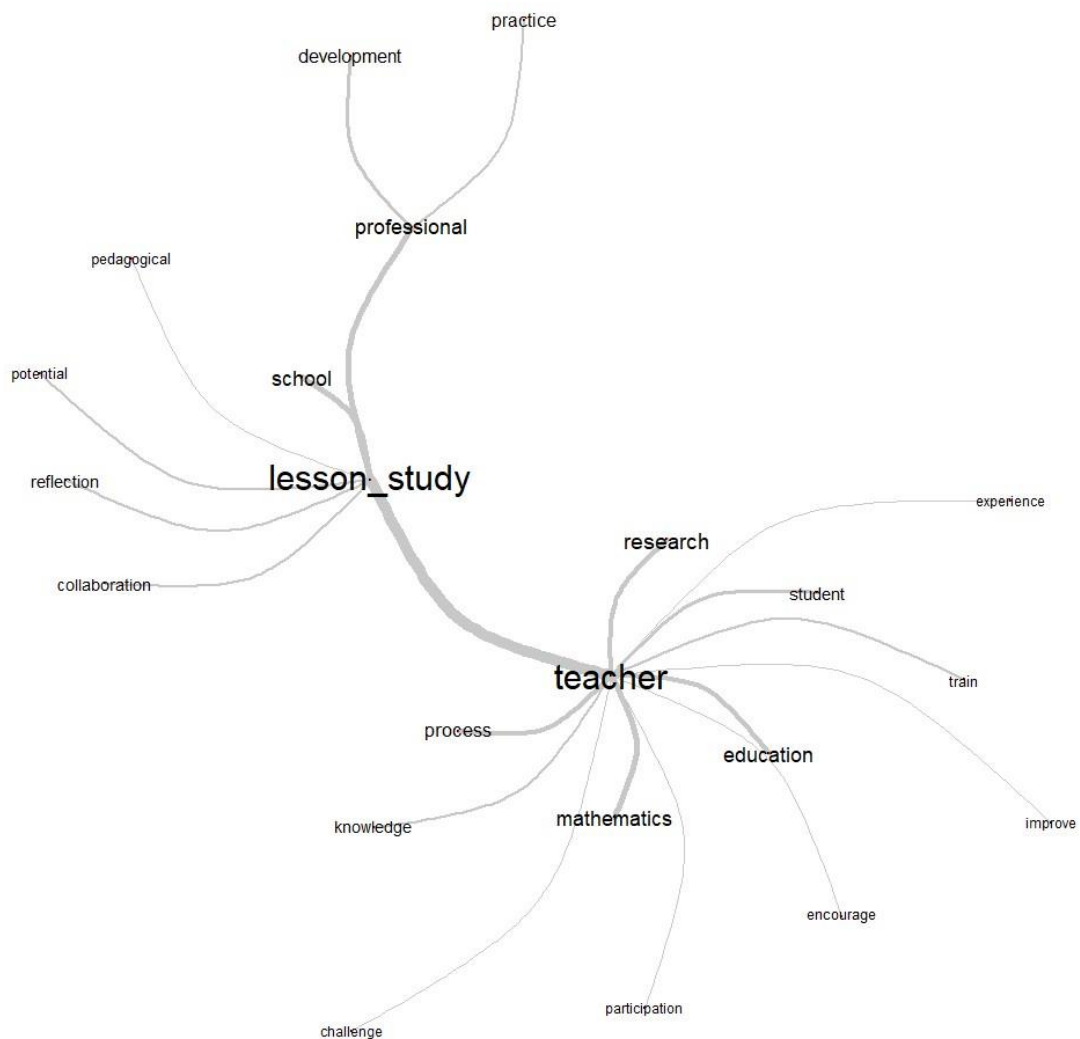
These findings imply that LS offers an innovative formative practice for teachers' professional development by reconstructing their practical knowledge, engaging with collaborative innovation initiatives, cultivating teacher-learning awareness, and transforming pedagogy.

4.2.3 Similitude Analysis

Finally, the similitude analysis entails an image illustrating the relationships among the words within the corpus (Figure 5). The examination was conducted on the abstracts of the selected studies. This representation allows for deductions about the texts' structure and the prominent themes. The connection among the terms is established through their co-occurrence percentages, with thicker lines denoting higher occurrences. Additionally, larger-sized words indicate more frequent usage within the text.

The terms "lesson study" and "teacher" are the central elements of two semantic sets of words from which other words branch out. The thicker connection lines in the graph show a greater relationship between words. This characteristic can be observed between the words "lesson study" and "school", "professional", "pedagogical", "potential", "reflection", and "collaboration", and the word "teacher", which is strongly connected to "process", "knowledge", "mathematics", "train", "students", "research". The results provide evidence that the abstracts of the evaluated articles help to identify themes that are mostly addressed in the papers of the corpus and also help to identify subthemes.

Figure 5 - Similitude analysis of co-occurrence in terms of the corpus.



Source: Prepared by the author (2024). Created with IRaMuTeQ.

A disturbing result is that the word “challenge” is distant from the nucleus “teacher” and does not even show a direct connection with the nucleus “lesson study”. Indeed, most studies do not discuss the challenges or shortcomings encountered during the LS process. At this point, it seems there is a call for Brazilian researchers to share their challenges and pitfalls and evaluate the quality of the LS study for specific purposes in the Brazilian context. A question remains unanswered: Where will their research guide them in the future? This discussion would prevent upcoming research from walking the same path, and ultimately, it would substantially contribute to the advancement of LS in Brazil.

FINAL REMARKS

This review of studies about the implementation of LS within educational environments in Brazil revealed a diverse array of scenarios, indicating practical implications and avenues for future research. Some issues must be addressed as educators are in the initial phases of adopting and implementing this innovative approach in Brazil.

The first issue relates to the definition of the objectives proposed for LS. A too-broad research aim yields outcomes that lack specificity and hinder a comprehensive understanding of the effectiveness of LS in specific contexts. For example, Müller and Quartieri (2023, p. 2) proposed “to investigate the potential of the Lesson Study methodology in professional development”. The results revealed that LS assisted in teachers' conceptual gaps, encouraged investigative and collaborative approaches, fostered communication and reflection, research in the classroom, and students' learning. Despite the positive outcomes, it is necessary to know what aspects of professional development were on target for that group of teachers, what challenges they faced, and how schools and public policies can rely on LS to address specific problems in the educational setting.

The second issue refers to the definition of the LS model underpinned by a sound LS framework. Some studies brought a detailed theoretical foundation on LS and aligned their investigation to other theories for specific objectives (Oliveira *et al.*, 2023; Richit; Hurtado; Silva, 2022; Tomkelski; Baptista, 2023). Nonetheless, some concepts may be misinterpreted. The notion of teacher collaboration as a central element of LS was denied and not properly referenced or discussed in Rodrigues, Santos, and Arroio's (2020) study. Another concept that merits attention is whether LS can be viewed as an intervention proposal. For example, Müller and Quartier (2023) refer to LS as an intervention process. Rodrigues, Santos, and Arroio (2020) conclude that additional interventions similar to the one studied are needed to enhance understanding of this formative approach. This sharply contrasts with Dudley *et al.* (2019), who state that considering LS as a curricular or pedagogical 'intervention' leads to misunderstandings, resulting in incomplete and distorted perceptions of its effects. Conversely, Elliot (2012, p. 114) regards LS as “an intervention into the workplace culture in classrooms and schools (...)”. In basic terms, this discussion depends on what theoretical elements are taken to define LS and what perspectives are coherent to that view.

The third issue concerns the explicit mention of the inclusion of knowledgeable others. The role of knowledgeable others is considered critical to helping participants connect the lesson with larger issues in pedagogy and matter content (Takahashi, 2014), having paramount

significance in contexts recently introduced to LS, as observed in the scaling of LS in the United States (Lewis *et al.*, 2006). Contrary to the international scenario (see Fluminhan; Schlünzen; Schlünzen Junior, 2024), the reviewed articles made no explicit reference to the participation of an invited advisor. As mentioned in the introduction section, an explicit feature of LS in Brazil has included knowledgeable others or external experts. Even when the article focuses on part of the research, it is recommended that LS groups share the key characteristics of the research developed and contribute to accurately disseminating their work with the broad community.

The fourth issue refers to sharing the challenges learned. In practical terms, researchers need to address particular aspects inherent to the local context during the implementation of LS. This would inform future investments in supporting teacher training in Brazil and contribute to the advancements of teacher education in such a distinguished culture.

The fifth issue relates to disseminating the LS experiences and outcomes. It was unclear whether the experiences reported in the studies included this or intended to share their results with a broader audience, including peers, practitioners, and the local community. The process of disseminating what is learned contributes to the learning of other professionals (Takahashi; McDougal, 2016) rather than limiting the knowledge to the LS group (Lewis, 2016). In this regard, Dudley (2014) suggests this initiative should be used to celebrate and value what has been developed, and participating teachers should be praised as “champions”. Furthermore, this endeavor should serve as a catalyst, inspiring fellow educators, departments, and educational institutions to engage in and support additional LS projects. This collective effort can significantly contribute to the expansion of LS initiatives (Lewis; Perry, 2015).

In conducting a scoping review on the Lesson Study methodology within the Brazilian educational context, certain limitations have been encountered. To enhance the feasibility of our review, we focused on articles from databases commonly used to host Brazilian journals and international databases that publish research on the theme. However, despite testing various strings in several attempts, a significant number of theses and dissertations conducted by Brazilians on this topic were not found in the format of peer-reviewed articles. Consequently, the findings apply to a small number of articles that were publicly accessible. Additionally, this scoping review represented a substantial effort, but it is pertinent to mention that the results presented herein are current only until October 2023.

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9 FOURTH ARTICLE

MICROTEACHING LESSON STUDY: STUDENT TEACHERS LEARNING IN INCLUSIVE PERSPECTIVES

ABSTRACT

Background: Providing effective teacher training toward inclusivity is one of the most challenging goals in education.

Purpose: The purpose of this paper is to explore whether participation in the Microteaching Lesson Study (MLS), underpinned by the Constructionist, Contextualized, and Meaningful (CCM) approach, facilitates collaborative learning and practical experiences toward inclusive education for student teachers.

Methods: MLS case studies were conducted in an undergraduate Pedagogy program at a public university in Brazil. Utilizing Lewis's (2002) framework and the CCM approach (Schlünzen *et al.*, 2020), nine groups, including 33 student teachers, collaboratively planned research lessons to be conducted in in-person sessions. Each group completed one cycle of MLS during one academic semester. Three knowledgeable others were invited to provide feedback and connect the lesson to larger issues involving the participants' initial education.

Results: Beyond providing authentic teaching experience, student teachers demonstrated enhanced teaching skills, ability to reframe original teaching concepts, enhanced collaborative learning, increased confidence and sense ownership of their work, higher levels of understanding of student needs and effective teaching strategies, and increased awareness of theory and practice integration and inclusivity. Participants' most common constraints were difficulties understanding the MLS process, lack of teaching experience, collaboration with peers, feelings of isolation, and unrealistic teaching contexts.

Conclusions: This paper argues for providing multiple teaching methodologies in teacher education and underscores the advantages of utilizing MLS to equip future teachers to embrace the teaching profession, build an inclusive identity, and overcome challenges in a solution-focused mindset.

Keywords: Pre-Service Teachers. Teacher Training. Inclusive Education. Collaborative Learning. Microteaching.

1 INTRODUCTION

Nobody becomes a teacher without the collaboration of more experienced colleagues. It begins at universities and continues in schools. Today, no one can be a teacher without the reinforcement of the collective dimensions of the profession. The future is written in the courage of action. Thinking the right thing is acting (Nóvoa, 2022, p. 73, our translation).

The disconnection between what is taught in education classes and teachers' work in the classroom is observed as a factor contributing to obstacles and concerns in the initial training of teachers internationally (Kotelawala, 2012). This claim is not recent and seems as complex

as the teaching profession. There is a consensus among experts that teacher education is never finished. Instead, it is a lifelong process (Gatti; Barreto; André, 2011; Nóvoa, 2022; Saito, 2012), usually in two distinguished stages: initial teacher training and continuous teacher education. Seen as divorced entities, this may be the reason why researchers and teachers have denounced the existing gap between theory and practice (Labaree, 2004; Stigler; Hiebert, 1999), that is, between the university (as a place for theoretical and methodological discussions) and the world outside (as a site of constant change and demands) (Lüdke; Boing, 2012).

However, articulating initial teacher education to the reality of school work and making it coherent with the needs of the learner and the local social demands is not an easy task (Gatti, Barreto, André, 2011). Researchers suggest opportunities that offer shared contexts for these professionals to explore pedagogical challenges and reflect and critically analyze teaching practices (Aas, 2020; Dudley, 2013; Nóvoa, 2009; Soto; Serván; Pérez, 2015). According to Korthagen, Loughran, and Russell (2006), some of the principles involving learning about teaching include (1) student teachers researching their own practice and reflecting on it, (2) student teachers engaging in collaborative work with their peers, (3) student teachers experiencing the teaching and learning advocated in the program being modeled by their teacher educators in their own practice, and (4) student teachers facing conflicting and competing demands, such as when they struggle to balance being students learning content and future teachers learning to teach.

An effective methodology for the professional development of future teachers, capable of meeting these demands and narrowing the gap between theory and practice, is Lesson Study (LS) (Da Ponte, 2017; Kanellopoulou; Darra, 2019; Lewis, 2002; Pan; Hung; Bai, 2023; Schipper *et al.*, 2020a). Within the context of initial teacher education, Microteaching Lesson Study (MLS) has been used as a learning practice to engage student teachers in genuine teaching experiences actively, preparing them for school-based situations (Fernández, 2010; Zhou; Xu, 2017).

In conjunction with LS and MLS, the Constructionist, Contextualized, and Meaningful (CCM) (Schlünzen *et al.*, 2020) approach can enhance teachers' initial preparation and professional development. The CCM approach views teaching and learning as holistic, valuing collaboration and diversity and situating learning in the learner's context. According to the CCM approach, effective education and inclusive education are synonymous concepts, grounded in the belief that learning is for all. It emphasizes the importance of meeting learners' needs and constructing knowledge based on their meaningful experiences. Fluminhan *et al.*'s (2022) review found that LS and the CCM approach share a similar nature in various aspects,

including fostering collaboration among teachers to enhance professional learning and emphasizing the importance of students' voices in advancing inclusive practices.

Several national and international research projects have explored LS's contribution to improving student teacher learning and professional development. Research has shown benefits to supporting teachers in assessing students' learning difficulties (Norwich; Dudley; Ylonen, 2014), creating a stronger sense of teacher community through collaboration (Akiba *et al.*, 2019; Cajkler *et al.*, 2014), enhancing beliefs of self-efficacy (Mintzes *et al.*, 2013; Schipper *et al.*, 2018); developing content and/or pedagogical knowledge (Cardoso; Da Ponte; Quaresma, 2023; Müller; Quartieri, 2023; Richit; Ponte; Tomasi, 2021), as well as increasing ability to observe students (Akiba *et al.*, 2019; Lewis, 2002; Richit; Ponte, 2020). However, a limited number of studies has investigated how teachers develop their understanding and actions relevant to inclusive education (Aas, 2020; Norwich; Benham-Clarke; Goei, 2021; Norwich; Dudley; Ylonen, 2014; Ylonen; Norwich, 2012), and fewer studies have explored LS in an inclusive perspective in the context of higher education (Oliveira *et al.*, 2023; Oliveira; Bracken; Nakano, 2021).

Despite the growing body of research on LS and MLS, areas within the context of inclusive education remain unexplored. While existing literature highlights the numerous advantages of LS for in-service teachers, limited knowledge exists about its application in other academic domains, particularly among pre-service Pedagogy students. Furthermore, there is a gap in the literature regarding MLS that emphasizes the utilization of technology-driven resources for advancing inclusive schooling. To address this issue, this study proposes an innovative design by implementing MLS practices grounded on the CCM approach within the context of teacher education. This study explores whether participation in MLS, underpinned by the CCM approach, fosters collaborative learning and practical experiences toward inclusive education for student teachers (Norwich, 2002). The questions examined in this study are:

(1) In what ways do student teachers perceive their learning process utilizing MLS and the CCM approach while engaging in a collaborative and reflexive approach?

(2) How can MLS and the CCM approach contribute to student teachers' learning regarding the practical aspects of inclusive education?

2 INCLUSIVE TEACHING THROUGH LESSON STUDY

Addressing the diverse educational needs of students currently stands as one of education's most ambitious and demanding goals. Within a fair and democratic society, this

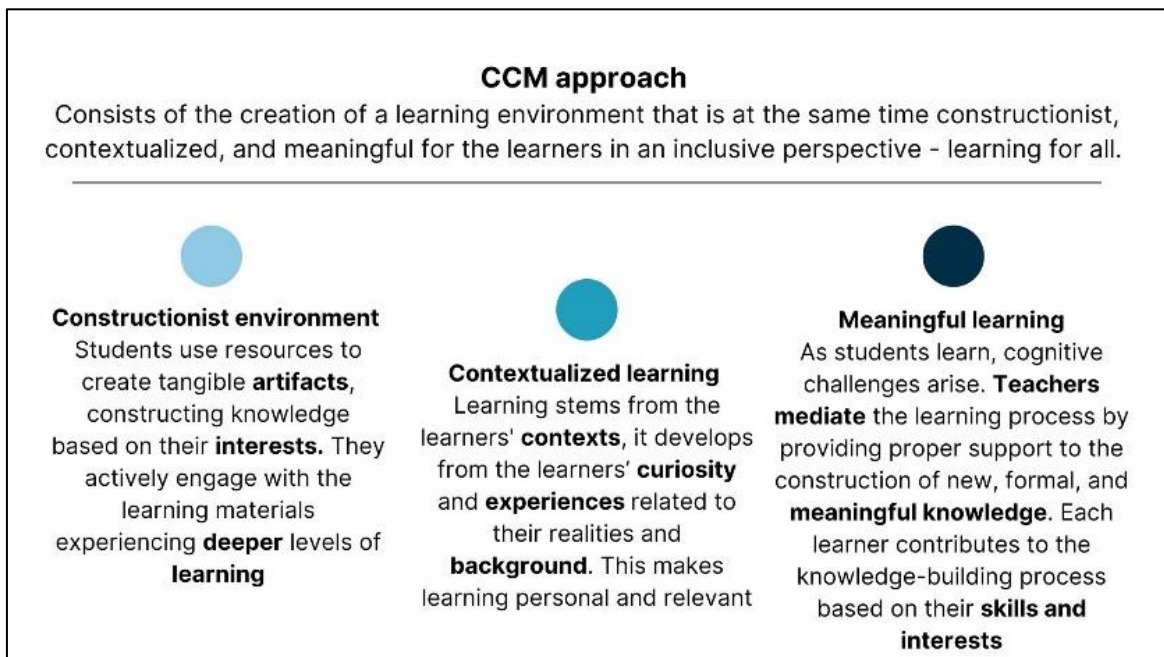
imperative emerges from the aspiration for education to embrace, acknowledge, and proactively respond to diversity (Norwich, 2002). As the inclusion of students with educational needs into mainstream education has emerged as a fundamental policy principle (UNESCO, 2017), teachers are confronted with numerous complexities in their responsibilities while working with diverse groups of students without marginalizing any by treating them differently (Florian, 2019).

According to Lanuti and Mantoan (2018, p. 120), "school inclusion is the process by which the educational act is redefined so that all students, without distinction, learn and develop based on their possibilities, desires, and interests." Thus, these researchers argue that this process shifts us towards alternative understandings of teaching, learning, and assessment, emphasizing equity during the teaching and learning processes and each student's uniqueness.

Promoting inclusive teaching and learning practices, therefore, irrespective of the class or academic level, guarantees that every student has access to a thoughtfully designed curriculum and an educational environment that challenges and appreciates the input of all participants. This involves establishing a sense of community within the larger learning setting, employing methods and techniques that amplify learning and teaching perspectives for every community member. It emphasizes fostering a culture of sharing and reflective practices, contributing to the inclusion and improvement of learning outcomes for everyone involved (UNESCO, 2017, 2023). Although necessary, it is hard work. As Florian (2019, p. 10) argues, in instances of success, "schools not only have pro-inclusion policies but they are staffed by teachers whose pedagogical practices are based on beliefs that all children can learn and they accept the responsibility for educating all children in the classes they teach."

Schlünzen *et al.* (2020) stated that the CCM approach was developed driven by the need to transform pedagogical practices to enable knowledge construction during teaching while simultaneously promoting autonomy and inclusion. According to the authors, there are three core principles that define the CCM approach (see Figure 1). First, the environment is constructionist because learning is developed from the learner's interests by actively creating tangible artifacts. Second, learning is contextualized because it stems from the learner's curiosity and experiences related to their background, making learning personal and relevant. Third, learning is meaningful because when cognitive challenges arise, teachers mediate the process by providing proper support for constructing new, formal, and meaningful knowledge. Furthermore, each learner contributes to the knowledge-building process based on their skills and interests.

Figure 1 – The Constructionist, Contextualized, and Meaningful (CCM) approach framework.



Source: The author (2024). Based on the CCM approach (Schlünzen *et al.*, 2020).

The success of implementing the CCM approach largely depends on the commitment of those involved in the educational process, including students in basic and higher education and teachers in initial and in-service training. Teachers must be willing to engage in continuous training and self-reflection for this approach to be effective.

As can be observed, the CCM approach is primarily based on the constructionist method, which is structured in a sequence of stages called "description-execution-reflection-refinement" (Valente, 2005). This sequence aims to promote learning that is simultaneously active, creative, meaningful, and contextualized, with the teacher playing a mediating role in the process. The goal is to provide a learning environment where the student is the protagonist, constructing knowledge in an integrated and conscious manner.

Schlünzen *et al.* (2020) defend that students engage with the proposed situation initially, identifying central elements and relationships and facilitating connections with their prior experiences. During the "execution" phase, they apply theoretical knowledge to tackle practical challenges, consolidating their understanding. In the "reflection" stage, they contemplate their learning process, fostering metacognition and critical thinking. Finally, in the "refinement" phase, they enhance their understanding through analysis with peers and educators, aiming to optimize their performance. The error can be undone without harm simply by returning to the previous state. These stages - description, execution, reflection, and

refinement - constitute an educational cycle that fosters knowledge construction, autonomy, and inclusion, addressing contemporary educational demands.

In this contemporary social scenario, the success of inclusive education and teaching depends significantly on educators encompassing their attitudes towards diversity (to foster inclusivity), their dedication, and their enthusiasm for cultivating suitable pedagogical expertise, competencies, and approaches to address a broader spectrum of student educational needs (promoting inclusivity) (Goei; Norwich; Dudley, 2021). The teaching practice, however, has evolved from an intuitive action to a field based on philosophical-social, historical-psychological foundations, and specific practices, requiring mastery of integrated and scientific knowledge, as well as humanistic perspectives, for an education focused on the new generations, centered on languages, technologies, and interpretative frameworks (Gatti *et al.*, 2019). Hence, teachers' challenges are even more complex when they lack training rooted in inclusivity and technical proficiency (Ruas, 2017). From this standpoint, the imperative questions are: How can teachers be adequately prepared to undertake such a critical endeavor, and how can educational programs contribute to equipping future teachers for this evolving educational landscape?

In this regard, Lanuti and Mantoan (2022) suggest it is necessary to restructure the school in a manner that facilitates the planning and execution of the teaching process, taking into account the unpredictability of human interactions, the individual's capacity for self-differentiation rather than comparison to others, and the recognition of the difference among all individuals rather than just a select few. This restructured school, however, requires new articulations between the school, the university, and the society. A further contribution comes from Nóvoa (2022, p. 45, our translation), who argues that:

The new school environments will not emerge spontaneously. Teachers have an essential role in creating them. Thanks to their knowledge and professional experience, they have a greater responsibility in the school's metamorphosis. To achieve this, they must appeal to their collaborative skills and build bridges, both within and outside the profession, within school, and in society.

Current insights into human learning emphasize that learning environments should ideally revolve around four key components: learner-centeredness, knowledge-centeredness, assessment-centeredness, and community-centeredness (Bransford, *et al.*, 2000). The concept of learning commonly revolves around the student's knowledge-building process, with efforts directed toward engaging students in the learning process. Conversely, teachers are expected to

provide students with stimulating and interactive activities, yet their own learning experiences often remain uninspiring and traditional (Fernández, 2005).

As we propose this research, we agree with Nóvoa (2022, p. 27) when he underscores the importance of the teachers, the learning environments, and the flexibility for effective education and adds that “the uniform and rigid structures of teachers and schools have their days numbered. Openness is needed to define diverse solutions and different educational, school, and pedagogical projects.” The underlying practice of the MLS methodology supported by the CCM approach is expected to facilitate a conducive environment for collaborative inclusive learning opportunities, paving the way for quality, meaningful, and relevant teacher education experiences.

3 MICROTEACHING LESSON STUDY FOR INITIAL TEACHER EDUCATION

More than ever, “teaching is an extraordinarily complex job” (Labaree, 2004, p. 43). Shulman and Shulman (2004, p. 259) describe that teaching is a multidimensional process that extends the classroom setting and entails at least five dimensions of personal and professional development: “*Vision, Motivation, Understanding, Practice, Reflection, and Community.*” Perhaps because LS encompasses all these five elements, it is valued by Japanese teachers and considered an effective methodology for promoting long-term improvement (Lewis; Perry, 2014; Stigler; Hiebert, 1999).

In LS, teachers work collaboratively to 1) formulate long-term objectives for student learning and development, 2) plan, implement, and observe a 'research lesson' aiming at accomplishing these long-term objectives while teaching specific academic content, 3) observe student learning, and participation throughout the lesson, and 4) analyze and review the lesson and instructional approach based on these observations (Akiba *et al.*, 2019; Dudley, 2019; Lewis, 2002). Murata and Takahashi (2002, p. 1880) observed that LS embodies characteristics associated with successful professional development, “such as using concrete practical materials to focus on meaningful problems, taking explicit account of the contexts of teaching and the experiences of teachers, and providing on-site support within a collegial network.”

In the context of initial teacher education, MLS integrates elements of microteaching and LS. In MLS, one student teacher teaches the research lesson to their peer students through structured practice and receives constructive feedback obtained from peers and instructors. It also involves discussions on how to enhance teaching techniques (Da Ponte, 2017). Allen and Eve (1968, p. 181), credited as some of the researchers responsible for developing

microteaching, define microteaching as “a system of controlled practice that makes it possible to focus on specific teaching behaviors and to practice teaching under controlled conditions.” While class size, duration, activities, and subject matter are downsized to create ideal learning settings (Fernández, 2010; He; Yan, 2011), microteaching holds versatility in its applications. It can serve various purposes, including professional training, diagnostic evaluation, and experimentation with innovative approaches within complex content (Allen, Eve, 1968).

Integrating microteaching and LS in initial teacher education is a relatively new phenomenon, and limited research is available on this topic (Carrier, 2011; Griffiths, 2016). The first initiatives suggest that MLS can positively impact student teachers’ practice by bridging theoretical academic content with teaching experiences, promoting collaboration and reflection (Fernández, 2005), fostering greater autonomy (Cajkler; Wood, 2019), enhancing confidence (Griffiths, 2016; Lamb, 2015), improving the ability to reframe events and problems (Fernández, 2010), enhancing classroom management (Yuliani, 2018), promoting collaboration and professionalism (He; Yan, 2011), and facilitating the provision of feedback on effective and ineffective teaching strategies (Carrier, 2011).

For example, Zhou and Xu (2017) found that MLS enabled teacher educators to gain insights into student teachers' learning processes and identify areas of difficulty. Yuan *et al.* (2023) investigated the impact of engaging student teachers in exercises designed to develop critical thinking through MLS. Participants demonstrated progress in developing critical thinking skills and dispositions, with negative emotions such as nervousness and disappointment transformed into stimulating sources for growth and professional learning. To our knowledge, no research on inclusive education utilizing the MLS methodology is available.

Overall, the most common complaint from student teachers is the lack of authenticity (Cajkler; Wood, 2019; Carrier, 2011; Yuan; Wang; Liu, 2023). However, researchers who support MLS argue that despite its artificial setting, the activity itself is authentic (Fernández, 2010; Yuliani, 2018). This is precisely why MLS is advantageous at the onset of teacher education.

Fernández (2005) identified two key aspects of MLS, as indicated by participating student teachers: collaborative group work to improve lessons and enhance content knowledge and hands-on experience in teaching the lesson. These findings are echoed in Yuan *et al.*'s (2023) research on the influence of teaching experience through MLS. The authors confirmed that student teachers developed critical thinking skills and dispositions as they created and implemented a series of lesson plans centered on big ideas. Facilitated by MLS, participants

were not only stimulated by their learning interests but were also prompted to think critically, analyze, and reflect as teachers.

The authenticity of MLS is endorsed by Fernández (2010, p. 359),

Although teaching small classes of student-peers produces a simplified classroom environment, MLS sufficiently maintained important and authentic aspects of the complexity of typical classroom practise in order to help focus the prospective teachers' attention on content pedagogy and the related student learning while engaging in managing classroom processes.

Critics of this perspective may argue that researchers undervalue the significance of preparing future teachers through field-based experiences. Nonetheless, proponents of MLS express their intention not to replace one approach with the other but to collaborate in enabling student teachers to gain insight into the teaching profession as early as possible (He; Yan, 2011; Yuliani, 2018; Zhou; Xu; Martinovic, 2017). The underlying idea is to provide novice student teachers with opportunities to engage in essential aspects of teaching, such as lesson planning, delivery, reflection, and revision (Fernandez; Robinson, 2006), thereby preparing them for school-based experiences.

4 CONTEXT OF THE RESEARCH

In Brazil, educators must successfully conclude an undergraduate Pedagogy program to obtain licensure for teaching in early childhood education, the initial elementary school years (equivalent to the first five years of regular schooling), and school management in Basic Education. This comprehensive program spans eight terms and encompasses both theoretical and practical coursework.

This study was conducted at a state university in São Paulo, Brazil, encompassing 34 campuses across 24 municipalities. Within the specific unit where the research took place, the Pedagogy program offers 80 annual vacancies, of which 35 are allocated for the afternoon session and 45 for the evening session. The program's curriculum comprises a total workload of 3.495 hours in the face-to-face modality. It is structured around three integrating axes designed to enhance coordination among the set of courses taught in each year of the program: i) Human Development, Formative Processes, and Discursive Practices; ii) School, Formative Spaces, and Learning Times; and iii) Formative Processes, Teaching, and Learning.

One important goal of this Pedagogy program, according its Pedagogical Political Project restructured in 2018 for students starting in 2019 (available at https://www.fct.unesp.br/Home/Graduacao/Pedagogia/ppp_pedagogia_fct_-2019.pdf), is to

provide student teachers with theoretical-practical training, through methodological courses that develop different curricular components and teaching practices, linked to classroom discussions. The idea is to encourage student teachers to overcome the dichotomy between theory and practice in initial education and provide them with meaningful learning, encompassing specific knowledge of teaching subjects and pedagogical knowledge.

Therefore, the current study sought to integrate a modified version of MLS into a practical, hands-on experience in a university classroom where student teachers could apply and practice their teaching skills under the guidance and supervision of an experienced subject teacher and the researcher. This empirical investigation occurred during one academic term, from November 2022 to February 2023, in an undergraduate course titled "Media and Technologies Applied to Education", a mandatory component of this Pedagogy program, with classes available in both afternoon and evening periods. The total workload comprised approximately 45 hours. This course is offered during the third term of the program.

The curriculum of the aforementioned course is structured around the following objectives: i) understand media, technologies, and cyberculture in early childhood and elementary education; ii) reflect on integrating media and Digital Information and Communication Technologies (DICT) in early childhood and elementary education; iii) comprehend the societal implications on contemporary social subjects; iv) familiarize and reflect on teaching practices using hypermedia language; and v) learn to teach with DICT in early childhood and elementary education.

In addition to the objectives outlined in the program documents, this course is offered based on the guiding principles of the CCM approach. In constructing this course, considerations include the foundations of pedagogical action for training teachers to understand the CCM approach. Also, discussions are proposed to address strategies for training teachers to develop pedagogical practices and techniques that foster the discovery of potentials and skills while valuing differences, utilizing DICT. The course also focuses on equipping teachers to develop curricula in which learning seamlessly integrates into the context and holds significance for students. Moreover, attention is given to identifying necessary training strategies for teachers to employ evaluative procedures consistent with the CCM approach proficiently. Additionally, the course delves into methods for training teachers to facilitate project-based learning rooted in experience, fostering improved interaction among participants.

5 RESEARCH METHODOLOGY

5.1 General background

The study employed a qualitative, exploratory (Gil, 2017), and inductive approach in its investigative methodology (Gioia; Corley; Hamilton, 2013). Utilizing qualitative data offered the benefit of capturing participants' perspectives and facilitating an understanding of their experiences (Creswell, 2015). This investigation aims to provide greater familiarity with the problem, to make it more explicit, and to form hypotheses. It can be said that the main objective of employing this design is to enable the refinement of ideas or the discovery of insights (Gil, 2017). Throughout the research process, rigorous ethical considerations were adhered to, and the study obtained approval from the Brazilian Research Ethics Committee, documented under the registration number CAAE: 61389822.1.0000.5402. Before the study started, all participants signed the Voluntary and Informed Consent Form (VICF). This document informed them about the research procedures and that their personal identification information would be maintained anonymously.

5.2 Participants

In the inaugural session of the academic term, the researcher elucidated the principles and process of the MLS methodology to the entire cohort comprising 66 student teachers enrolled in the "Media and Technologies Applied to Education" course, both in the afternoon and evening sessions. Since all of them were new to LS and MLS, guidelines were offered, drawing on Lewis (2002) and Fernández (2010), and included the participation of external experts, as recommended by Takahashi and McDougal (2016). Emphasis was placed on the importance of directing observation toward the learning process and fostering positive mutual consideration among participants throughout the process, particularly during the evaluation phase. This approach aimed to address challenges identified in previous research, such as the work of Tsui and Law (2007), in which student teachers' anxiety was reported as a consequence of negative feedback. Subsequently, the researcher and the subject teacher extended invitations to all student teachers for their active involvement in a research endeavor characterized by the MLS format. Comprehensive details about the research process were provided to the student teachers, ensuring they were apprised of all pertinent information concerning their participation in the study.

Following inquiries and discussions initiated by student teachers regarding the procedural aspects of the research, a contingent of 33 students opted to abstain from engaging

in the MLS methodology, expressing a preference for more traditional classroom methods. In these "traditional classes," the subject teacher recommended readings, and subsequent discussions were held in the following sessions. Additionally, these student teachers preferred a traditional assessment test at the end of the semester based on the readings and in-class discussions. Therefore, this cohort was assigned distinct activities throughout the semester, diverging from the instructional trajectory followed by the MLS groups.

Consequently, the MLS participants consisted of 33 student teachers who were actively engaged in the course, attending either the afternoon or evening sessions. The cohort comprised 29 female and 4 male student teachers, ranging in age from 18 to 41 years ($M = 22.73$, $SD = 12.50$). Of the participants, 51% reported having worked in the field of education for up to two years. Among them, 85.6% declared they had worked as teacher assistants, advisor assistants, or interns in the Pedagogy program.

Student teachers formed nine MLS groups (see Table 1). The research was conducted during nine sessions, three of which were conducted in person and the remainder delivered through synchronous online mode. Each session lasted approximately four hours, and throughout, the subject teacher and researcher provided guidance and support.

Table 1 – Organization of the Microteaching Lesson Study (MLS) groups participating in the research.

Session period	Teacher candidates enrolled		n	Group divide
Afternoon	25	Participated in the MLS methodology	21	6 LS groups
		Declined to participate in the MLS methodology	4	
Evening	41	Participated in the MLS methodology	12	3 LS groups
		Declined to participate in the MLS methodology	29	
Total	66	Participated in the MLS methodology	33	9 LS groups
		Declined to participate in the MLS methodology	33	

Source: The author (2024).

Three experienced teachers in higher education, specialists in teacher training and inclusive education, were invited as knowledgeable others. These teachers served as external experts for the MLS groups. One of them conducted research on implementing LS in the Brazilian context. The other two are familiar with LS through readings and academic discussions.

5.3 MLS Procedures

A modified MLS cycle was developed to enhance the process (Figure 2). Key steps (2, 3, 5, 7, and 9) addressed fundamental aspects consonant to Lewis' (2002) four-stage structure and the participation of knowledgeable others (Takahashi, McDougal, 2016). This modification expanded a basic LS cycle to encourage active participation and support student teachers throughout the process. Participants were also encouraged to seek clarification or guidance on procedures through online communications, such as email or text messages, outside of regular classes, from both the researcher and the subject teacher, as needed.

Figure 2 – Outline of the Microteaching Lesson Study (MLS) process.



Source: The Author (2024).

After discussing the principles of MLS and signing the VICF (step 1 in Figure 1), the student teachers were led to think about a specific topic for teaching, the instructional goals, and to propose an assessment for the lesson. Using the CCM approach, which had been thoroughly discussed in the previous term, student teachers were challenged to incorporate a

technological resource (either digital or analogical) into the lesson to be used in an inclusive perspective. Their first thoughts were shared on the walls of Padlet (a digital communication platform), so all their peers could collaborate (step 2).

For this research lesson, groups developed detailed lesson plans, specifying the number of students in the simulated class and including at least one student with special educational needs (SEN) (step 3). Although the CCM approach advocates for inclusion as learning with equal opportunities for all students, for this model of MLS, it was necessary to evidence student teachers' awareness in planning and implementing a lesson tailored to individual educational needs and, in doing so, they had to find creative solutions to ensure equal learning opportunities for a student with SEN as well. However, observation and analysis focused on all students' learning.

The subject teacher provided a lesson plan model outlining the items that needed to be addressed. All lesson plans were shared with the researcher and the subject teacher via a Google document (step 4). Table 2 describes the context of the research lesson and the activities proposed by each MLS group.

Table 2– Research Lesson context and activities proposed by the Microteaching Lesson Study (MLS) groups.

MLS groups (number of participants)	Students' fictional context (created by MLS groups)	School subject / Pedagogical content	Technological component (1 st lesson plan)	Technological component (revised lesson plan)	Assessment proposed
Group 1 (4)	<ul style="list-style-type: none"> • 2nd year of Elementary school • 20 students (1 with visual impairment) 	Portuguese/ Regional Brazilian literature named Cordel	Video with sign language	Online quiz on specificities of the regional literature	Production of a stanza
Group 2 (4)	<ul style="list-style-type: none"> • Pre-school • 24 students (1 physically disabled) 	The child, nature, and society / Organization of groups and their way of being, living, and working. Places and their landscapes)	Photos projected on the screen	Memory game on a digital platform	Teacher observation
Group 3 (3)	<ul style="list-style-type: none"> • Pre-school • 21 students (1 with visual impairment) • 2 interns 	Arts / Storytelling	Sound media resource as the soundtrack of the story	Software to describe slides in audio format	Interaction with the lesson, socialization with teacher and peers

MLS groups (number of participants)	Students' fictional context (created by MLS groups)	School subject / Pedagogical content	Technological component (1st lesson plan)	Technological component (revised lesson plan)	Assessment proposed
Group 4 (2)	<ul style="list-style-type: none"> • Pre-school • Mainstream group, one of whom has Autism Spectrum Disorder 	Interdisciplinary / Respect for Earth Day	Explanatory video on how to plant beans	EDPUZZLE platform for interactive and creative lessons, Pinterest for idea reference to elaborate creative lessons	Students' interaction throughout the lesson
Group 5 (4)	<ul style="list-style-type: none"> • 3-grade Elementary School • Mainstream group, one of whom has a visual impairment, 1 with intellectual disability, and another with a hearing impairment 	Interdisciplinary / Safe use of digital media in the search for reliable information	Laptop or desktop computer for the teacher to demonstrate examples related to the content	Game competition utilizing laptops or desktop computers where students search for answers within a limited time frame	Continuous teacher observation
Group 6 (4)	<ul style="list-style-type: none"> • Pre-school • 22 students, one of whom has low vision (vision below 20% in both eyes), 1 intern/caregiver who assists the visually impaired student 	Geometric / Shapes (Circle)	A song to introduce the lesson, a video, a song to wrap up student learning	Digital platform that allows the creation of interactive activities in a gamified model; desk computers;	Continuous teacher observation
Group 7 (3)	<ul style="list-style-type: none"> • Pre-school • 18 students, including 1 autistic and 1 with ADHD 	Portuguese / Textures, verbal communication, interaction, emotions, social play, imagination, senses, motor coordination, identification, vocabulary, phonological awareness, comparison	A song to practice the alphabet	Missing information	Photographic records, observing the students' behavior, participation, and interaction during the proposed activity.
Group 8 (3)	<ul style="list-style-type: none"> • Pre-school • 25 students, one of whom is an autistic student with 	Mathematics / Quantification, counting, sequencing, ordering of numbers; the use of mathematics	A song to introduce numbers, an app to play math games,	Addition of the analog Genius memory game	Continuous teacher observation

MLS groups (number of participants)	Students' fictional context (created by MLS groups)	School subject / Pedagogical content	Technological component (1 st lesson plan)	Technological component (revised lesson plan)	Assessment proposed
	speech impairments	in practical contexts in students' daily lives; the comprehension of concepts of addition and subtraction in practical situations			
Group 9 (6)	<ul style="list-style-type: none"> • Pre-school • Mainstream group, one of whom has a visual impairment 	Mathematics / Flat geometric shapes	A video about geometric shapes; an online game to develop fine motor skills, shape tracing, and reinforce figure identification	Missing information	Missing information

Source: The author (2024).

All nine research lessons were conducted face-to-face during class (step 5). While one member of the MLS group was teaching the research lesson to their peers, the other members observed and took notes on specific aspects of the lesson previously agreed upon. The observation focused on student learning (performed by their peers), whether their planned lesson fostered collaborative learning, and how effective it was in promoting inclusive education.

After the lesson observation, all members shared their written reflections via a Google document (step 6). Student teachers were asked to include their perceptions related to their own participation in the process, the impact on their initial teacher education, and suggestions to improve future MLS projects in the Pedagogy program. Online reflection meetings were arranged between the researcher, the subject teacher, and each MLS group individually (step 7). The objective was to discuss the process and encourage them to share their experiences in more detail. They also had the opportunity to clarify any questions they had. During these meetings, the MLS groups were challenged to revise their lesson plan, make necessary adjustments, and incorporate different technological resources besides videos. These revised lesson plans were shared via Google document (step 8). However, research lessons were not repeated and re-observed in subsequent cycles, following the methods outlined by Hiebert and Stigler (2000) or Dudley (2019). Lewis (2002) considers re-teaching the research lesson an

optional procedure not stressed in the international literature (Baumfield *et al.*, 2022). Fujii (2016, p. 414) points out that “the notion of *Re-Teaching* is extremely problematic and sensitive” and suggests its presence or absence may result in different outcomes to the planning and the discussion of the process.

After the reflection sessions and the revision of the research lesson, all MLS groups gathered in the afternoon or evening session, depending on their chosen period, to receive feedback from external knowledgeable others (step 9). Two weeks before this final session, the three invited knowledgeable others received the lesson plans, research lesson observation notes, and reflection work from the MLS groups. Since they were new to participating as knowledgeable others in an MLS cycle, the researcher met with them individually to explain the process the student teachers went through and provided them with a list of expectations for their contributions, following Takahashi’s (2014) recommendation. Each knowledgeable person was assigned to three MLS groups to give their final comments on their research lesson.

To comprehend student teachers' perceptions regarding their learning trajectory throughout the MLS process, a reflective questionnaire was developed and distributed via Google Forms (step 10). The questionnaire comprised 24 items organized into three sections. The initial section included 7 socio, academic, and demographic questions. The subsequent section consisted of 7 items evaluated on a five-point Likert scale ranging from 1 ('Strongly Agree') to 5 ('Strongly Disagree'), such as, 'Throughout the course, I believe that I have acquired a deeper understanding of how to become an inclusive teacher.' Additionally, participants ranked the importance of each MLS step on a scale from one to seven according to their perception. The final section encompassed nine open-ended questions in which participants delineated their perceptions of the initial teacher education process they underwent. They were also encouraged to identify any ineffective aspects and suggest improvements for future MLS projects (e.g., 'If given the chance, would you propose modifications to the methodology employed in this study? If affirmative: 'What changes would you recommend?'). Although 33 student teachers participated in the MLS implementation, only 27 (81.82%) participants returned the questionnaire.

5.4 Instruments

Data sources included MLS lesson plans, Padlet walls, participants’ written reflections and research lesson observation notes, transcripts of video recordings of meetings and class sessions, researchers’ observation field notes, and a reflective questionnaire. Table 3

demonstrates the wealth of data produced in each MLS step. It is important to mention that all written materials, collaborative oral activities, the implementation of the research lessons, and the online sessions were produced and conducted in Portuguese. The video recordings were transcribed in Portuguese and subsequently translated into English by the researcher. The same process was applied to the excerpts shared in this article.

Table 3 – Data produced in each Microteaching Lesson Study (MLS) step.

MLS steps	Data produced
Step 1	Researcher field notes
Step 2	Padlet walls
Step 3	Researcher field notes
Step 4	Lesson plans
Step 5	Research Lesson observation notes from MLS groups and researcher, pictures taken during the Research Lesson teaching
Step 6	Written reflections from MLS participants
Step 7	Video recording transcripts of reflection sessions and researcher field notes
Step 8	Revised lesson plans
Step 9	Video recording transcripts of Knowledgeable Others' final comments and researcher field notes
Step 10	Reflective questionnaire

Source: The Author (2024).

6 DATA ANALYSIS

As a theoretical framework, the CCM approach (Schlünzen *et al.*, 2020) viewpoint on learning in a contextualized, inclusive, and meaningfully situated perspective and the MLS methodology aimed at promoting student teachers' learning (as in Carrier, 2011; Yuan; Wang; Liu, 2023; Yuliani, 2018; Zhou; Xu; Martinovic, 2017) formed the basis of analysis. Lewis's (2002) and Fernández's (2010) descriptions of the LS and MLS models were also drawn on.

A thematic analysis offered a more detailed examination of several themes within the data (Braun; Clarke, 2006). These themes revolved around student teachers' learning supported by the theoretical framework adopted in this investigation and the factors influencing this process, including supportive and hindering factors. The Google Forms web-based questionnaire treated the quantitative data by generating a graphical representation and recorded

the qualitative data in a Google spreadsheet in an analyzable format. Although this study employs a qualitative approach, it is important to highlight that quantitative elements were also incorporated into the data generation process. The complementary nature of these data boosts analytical rigor and serves as a method to validate participants' perceptions.

The multiple data sources described in Table 3 were used to triangulate the findings. By thoroughly examining the data produced, student teachers' perceptions and constructions underwent analysis, interpretation, and categorization into thematic units. A total of four thematic units emerged:

1. MLS group collaboration
2. Inclusive teaching
3. Impact on teaching practice
4. Student teachers' perceptions about their learning experiences

The excerpts will be labeled according to the participant's group, and a specific number will be randomly assigned to each group member. For example, student teacher 1 from MLS group 3 will be identified as G3_ST1. The names of both the subject teacher and the researcher were replaced with their respective roles as subject teacher and researcher.

Given our interest in understanding student teachers' perceptions of their learning process and their views on the practical experiences enabled by the MLS methodology, the contributions of knowledgeable others will be presented and analyzed through student teachers' perceptions. Future studies should explore the work provided by these professionals, including their preparation, how they organized their comments, and the focus of their contributions.

7 RESULTS

The results present student teachers' perspectives on their collaborative learning and teaching practice experiences towards inclusive education.

7.1 MLS group collaboration

MLS groups reported that the inter-collaboration initiatives worked well, effectively, and positively to elaborate and teach a research lesson. When asked if they considered they could learn collaboratively with their peers, 92.6% of them responded positively (63% strongly agreed and 29.6% agreed). Student teachers exemplified positive interactions, providing a sense of trust among the members and allowing them to welcome individual experiences to add

knowledge to the group. This feeling was acknowledged as an important experience that made them feel safe and lower anxiety about learning in a non-judgemental environment, as reported in these comments:

I really enjoyed the experience because I felt like I felt I was free to make mistakes and learn from them, all while working with my team in a relaxed way. It was great to be able to apply what I learned to my profession (G7_ST2).

It's a cool experience because we're allowed to make many mistakes there. We can see what we need to improve, what we're going to improve, what's going to be more challenging, and that's why it was a nice experience (G7_ST1).

I want to point out that it was extremely important because, in addition to participating, we had the support and help of other students, which allowed us to reflect on our strengths and weaknesses during the process (G6_ST1).

However, one of the nine MLS groups experienced frustration with their group work, reporting “little cooperation from a group member” (G4_ST1) who did not participate in any meetings or engage in the activities. Similar conditions were reported in a project involving 12 MLS groups (Fernández, 2005). In that study, the instructor developed a rubric for prospective teachers to evaluate each group member's contributions to the MLS process. This tool was seen as part of the project expectations and as a platform for sharing perceived difficulties and successes.

There were also several comments across the MLS groups referring to the idea of collaboration, suggesting the support they received from the subject teacher and the researcher to guide and facilitate their work was significant for their learning process:

The support and meetings throughout the activity development process were very important for me (G9_ST4).

The methodology used throughout the course, from the initial explanations about the tasks to their completion with expert analyses, was highly beneficial. The constant dialogue between team members and teachers, when requested, was crucial for the development and the good results achieved (G9_ST3).

When the task was proposed by the subject teacher, the classroom became extremely agitated because we felt incapable of resolving the situation. I include myself in this context because I had the same feeling. However, my group and I decided to at least try to complete the task. This caused discomfort in the classroom, and some people chose not to do the tasks and took other actions. Over the course of the days, with guidance from the teacher and the researcher, ideas began to clarify [...] I confess that I thought it would be more difficult, almost impossible, to complete this task. However, with the teachers' assistance, I understood it wasn't as challenging as I had imagined (G8_ST3).

Student teachers pointed out a particular perception that collaboration was crucial to developing all activities proposed in this MLS. Overwhelmingly, the participants expressed their views on the importance of collaboration with the other MLS groups during the process. An MLS group, for example, invited a peer from a different group to represent a blind student

during their research lesson and asked her to blindfold her eyes with an appropriate band. They counted on their peer to demonstrate how they would develop an inclusive class. In this sense, student teachers credited the success and extra difficulties they tackled during this process to the other groups' interactions and support (or lack thereof). Some positive experiences are reported in the following excerpts:

I liked everyone's sense of collaboration and interaction. I think when we watch people our age teaching, we think that if we talk too much, we might end up disrupting the class. However, we needed that communication (G3_ST3).

So, our classmates played the role of the children at that moment. The way it was done was essential, and the way it was done was amazing. Our class was very participative and required everyone's involvement. They had to memorize where the booth would be. They would go to it and handle the instrument to see how it works to continue the class (G5_ST2).

The group was surprised by the students' interaction, as one student even attempted to sing with the teacher's assistance, resulting in an even greater mastery of the content in a playful and relaxed manner (G6 Collaborative Reflection).

Conversely, the three evening MLS groups mentioned that many of their peers refused to participate in the MLS methodology. They were present when they taught their research lesson, which created a tense atmosphere and added anxiety to their activity.

[...] when I was there teaching and trying to interact with people, and because there was no interaction, I felt like it slowed down the class a bit, you know (G7_ST1)?

I think people didn't want to participate because they were very overloaded with work (G8_ST2).

It was difficult to carry out this task with the class because there would be interaction among the students in a regular school. The students would interact with our work, but that didn't happen in college. I don't know if our group could have helped because of this interaction with G9_ST3. For example, she would ask, "Can you look and figure out where the square is?" and then no one would respond... so that interaction was lacking for me (G9_ST2).

Even facing such adversities, student teachers thought of solutions to overcome the challenge of teaching a class for students who, at some point, demonstrated animosity and lack of enthusiasm. In addition, this constraint instigated participants to understand that unexpected situations may also occur in the school setting and, as they experienced in the MLS, teachers are supposed to be flexible to tackle them:

I imagine, like G9_ST2 said, it wouldn't be like this in school. In school, someone would probably interrupt and ask something all the time, but that's not how it works in college. So, somehow, I would think about 'bringing' that participation [to the activity carried out at university]. Maybe with a game. I don't know if we could have found a game link and sent it to the group, and then the results would show up for us. But maybe we should have done that, you know, finding a game that everyone would join in and that we could see the class involvement there (G9_ST4).

Also, if we had formulated questions for the class... I think I saw a few actually asking. Because one way to interact is by asking questions. It's a way to get more attention. So, we just commented, "This is a square". For example, we could have asked, is this a square? It's a way to have more of that interaction (G9_ST2).

After meeting with the researcher via Google Meet, we clarified, discussed, and debated what we felt and perceived during G8_ST3's lesson plan presentation. Regarding our notes related to the difficulties we encountered in the class interaction, the researcher asked us to reflect on how this can happen in our daily lives. We may encounter resistance from students in class interaction, in paying attention, in understanding the content, and it is necessary to be "flexible" in conducting the class (G8_ST1).

Teaching a lesson that evolved from collaboration revealed a sense of shared responsibility and support, significantly contributing to their learning experience. Participants demonstrated that the MLS process allowed them to own their research lesson equally, irrespective of the role they played during the teaching phase:

I think the main problem with our lesson plan is that it wasn't as detailed as it should have been. So, we should have elaborated on each stage of the process better so that we wouldn't have had the problems we did. When it came to dividing the groups, G2_ST3 was a bit lost because we didn't detail that in the lesson plan. So, we assumed that it would happen naturally at the time, but it didn't. And it's not G2_ST3's fault. It's the group's fault (G2_ST2).

7.2 Inclusive teaching

Student teachers' comments on their understanding and disposition to inclusion pertained to various issues relating to valuing difference, seeking the appropriate resources, and expressing empathy. When asked whether, throughout the course, student teachers considered they learned more about how to become an inclusive teacher, 66.6% of the participants responded positively:

A specific course to address inclusion issues is already a distinctive feature in teacher training, fostering immense reflection and transformation, even on an individual level, for future classroom work (G5_ST2).

Through the guidance I received from teachers, I could better understand how to plan a lesson using inclusive technologies and how to apply them appropriately (G9_ST2).

[I had] a broader perspective on all aspects, initially understanding that no student is the same as another but that each is an individual to be understood (G8_ST2).

Among the participants, a negative perception of this experience was reported by 7.4%, while 25.9% expressed indifference towards their learning regarding inclusivity. Reasons cited for this viewpoint include that student teachers had previously studied the CCM approach in the preceding term. Additionally, concerns were raised regarding public

school facilities' lack of appropriate infrastructure to accommodate all students' needs. These observations are expressed in the following:

Overall, I didn't like the proposal. I think it adds very little and doesn't fit the reality of classrooms in Brazilian public preschools, where there aren't even projectors, computers, and speakers available. I don't believe it gave me *more* conditions to be an inclusive professional because it didn't add anything about inclusion. We worked with the knowledge we already had from last semester's subjects (G2_ST2, emphasis is given by the participant).

In contrast, some student teachers found participating in the MLS methodology beneficial as it prompted them to reflect on strategies to address the inadequate quality of school infrastructure:

It made me think about how to use the limited infrastructure of public schools in more engaging ways for students [to become more inclusive]. Contributions: How can we include everyone with simple adaptations? (G1_ST1)
 [It made me] see all the possibilities for my students to feel included in the classroom and do the activity as they can and are capable of at the moment (G4_ST2).
 While developing the lesson plan, we had to seek adaptations for activities, which allowed me to expand my knowledge regarding inclusion (G6_ST3).
 [I have become] a professional who pays attention to creating a lesson plan that all students participate in and thus achieve full learning (G6_ST1).

This perception of inclusion aligns with the comprehensive definition of inclusive education proposed by the CCM approach. Through previous discussions and readings, student teachers expressed their understanding of the concept of inclusive education, as evidenced by the following excerpts:

[I learned] that it is possible to develop students [’s learning] using resources and materials that are the same for everyone (G9_ST2).
 It [the MLS process] made me want to learn inclusive methods because I want to be a teacher who caters to all children (G7_ST2).
 When I'm with students with disabilities or when I'm not. Technology will help everyone. G9_ST6
 During the video, the visually impaired student received assistance from her caregiver and handled round objects that the teacher brought specifically for the class, which were mentioned in the video. Then, the teacher invited all the students to handle the objects as well, and some students went [for it] and had fun (G6_ST2).

Participating in MLS has instilled in student teachers to think critically about the quality and effectiveness of the inclusivity they offered to their peer students during the research lesson. Some participants expressed that not everything went as they had planned and recognized that the conduction of their research lesson did not meet all students' necessities. For instance, G6_ST1 shared that although her group had planned an inclusive

lesson, that is, providing conditions for all students to participate in all activities autonomously, she failed at the moment she was teaching:

I felt that I made a mistake in the inclusion part because G1_ST2 [the peer student who acted as a person with visual impairment] ... I tried to make the class fully inclusive in every way, but when it came to sticking the caterpillar, I forgot to ask her to stand and stick it. I ended up sticking it for her, and then she complained about it. So, I dealt with that situation by cutting out another circle and asking her to put it at the end of the caterpillar. We sometimes overlook these things in our daily lives, right (G6_ST1)?

We had some reports from a student with a hearing impairment. Unfortunately, she was not included in a good part of the class. That was a point where we failed in planning this class. We focused a lot on how to involve the students in creating the space for technology and how to make them interested and really participate. We lacked giving greater attention to students with disabilities. And as we specified, this was a commitment that we ended up overlooking (G5_ST2).

The deaf student was excluded, but the visually impaired student was attended to. But this is the reality of the classroom (G5_ST4).

This experience made some student teachers feel they could improve their teaching practice and be more attentive to all students' needs. The desire to overcome difficulties was effective in identifying possible solutions:

If I had the opportunity to teach this class again, I would change quite a lot. [...] There's the part of the song I sang at the beginning of the class, where we had to clap our hands, stamp our feet, and smile. But then I realized that a child with autism spectrum disorder is sensitive to loud actions and noise. After remembering that, I said, "Children, we need to be quiet out of respect for our friend G3_ST3; she doesn't like noise and such..." But before that, I had already made noise, and the students had also made noise, right? So, I would change quite a lot if I could teach the class again. But the experience was very good (G4_ST1).

They [peer students] approached us as observers to speak, [...] since G5_ST1 was teaching. In this case, they stepped out of character to report what was happening to them as interpreters. "Oh, they're not paying attention to me here." And then they would return. We [research lesson observers] didn't interact. We didn't respond or anything. We accepted what they said, took notes, and reflected on the moment. However, we did not interact with them to avoid disrupting the class and not changing the path or the flow (G5_ST2).

Situations like these allowed participants to appraise the problem by carefully examining the facts and looking beyond that specific research lesson conducted during the MLS. A special remark was made toward a shared awareness that inclusive education requires understanding the student's context and individual needs, skills, and interests. Therefore, student teachers reported that their teaching practice should focus on all students rather than on some and highlighted a concern with providing opportunities for active engagement of all students. This was expressed in the following excerpts:

[I need to] position my students at the center of the process, giving them autonomy to learn in the way they find best so that, in the end, I can help them with my considerations (G7_ST2)

[I want to provide classes] with accessibility in activities. Using digital resources can be a very useful tool tailored to the classroom context (G9_ST3).

I could understand that the teacher's role extends beyond the teaching-learning process, especially considering the context of students with special educational needs in Brazilian public schools; the teacher must be a mediator/facilitator capable of meeting all students satisfactorily (after all, education is a subjective right), without spaces for failures or learning deficits, and allied with technology and AT resources, which facilitate and open doors to experiences that would be overlooked due to complexity or even impossibility of carrying them out without these resources (G5_ST1).

[I learned to] allow students to create projects, PowerPoint presentations, and videos, all in context with what is being worked on in the classroom. This autonomy will make learning easier for the students because they will be the builders of that element (G9_ST3).

This proves that MLS is an instructional approach that challenges student teachers beyond their comfort zones (Fernández, 2010). In this study, MLS encouraged student teachers to question their practical knowledge while engaging in collaborative experiences within genuine tasks. It is worth adding that this experience enabled student teachers to transcend the academic realm. It fostered a will and predisposition to learn and reflect on the kind of professionals they aspire to become.

7.3 Impact on teaching practice

Many participants who were initially cautious, dissatisfied, or opposed to engaging in MLS developed a stronger sense of self-efficacy toward their capacity to participate in the proposed activities. Little by little, their feelings of incapacity and anxiety were reconceptualized, and situations previously seen as 'impossible to accomplish' were redefined as 'an initial kickoff'.

Because I am quite shy, you know? So, I imagined I wouldn't be able to teach, present a proposal, show, teach, or go back to the idea to explain it a little better. So, this learning was like an initial kickoff for me to already think about other activities, like when I have my own class, right? [I got to] change this behavior regarding calmness, you know, nervousness (G4_ST1).

At the beginning of this activity, I thought it would be much more [difficult], not that it was easy, it was a bit complicated. Still, I thought it would be almost impossible for me, for us, but we managed to complete this activity. Even more so when it came to teaching, I thought, "Wow, I won't be able to do it; how am I going to do it, like teaching a class?" I thought it would be... But as you develop, you realize that it's not such a tough nut to crack; it's not impossible for you to do it, and I think that's what most people in the class thought it would be, a tough nut to crack (G8_ST3).

At first, I felt nervous because I had never done a project where I would act as a teacher. It was a cool experience. I really enjoyed this activity, letting out a bit of creativity (G7_ST1).

When student teachers were asked if participating in MLS provoked reflections on their future teaching practice, 44.4% strongly agreed, and 48.1% agreed. The impact of this was powerful for the student teachers and enabled them to acknowledge the importance of being open to experimenting with new approaches to enhance their teaching practice:

After the Google Meet meeting with the researcher, it became even more satisfying because it was evident that the evaluation criteria wouldn't be as I had imagined. It wasn't about pointing out what was right or wrong, but rather a self-reflection on what could be done, what was missing, and what I could improve in a future task. For example, I mentioned that I could have interacted more with the class (G6_ST2).

Innovation in education has always been and will always be welcome, but how do we incorporate it into our daily lives? So, this course came to us to provide this path (G5_ST4).

It was an enriching experience that allowed me to see some situations that occur in the classroom differently (G9_ST4).

Learning about this method, which I had never heard of before, was very interesting (G6_ST3).

The method was different from the conventional teacher-led reading and speaking, so initially, it caused surprise, anxiety, and nervousness. Over time, however, we managed to deal with this whole context that deviates from the "normal" as a team (G8_ST2).

Situations like these were successful in facilitating greater reflection on personal beliefs that had a profound impact on their self-efficacy. Student teachers began to challenge their previous perceptions of their capacity to achieve specific goals and, as a result, reconsidered their position:

The main lesson I learned was to at least try, you know? When I realize that not only in college but also in my future profession, God willing, I pursue it if I come across a challenge or something that seems very difficult in my mind, something that seems impossible for me to achieve or to do, at least I will try. I will try, you know? I won't define it in my mind as something impossible to do, something I won't do, and that's it. At least, I will try. I will try to do it. And that was a key lesson for me regarding the activity itself, you know? But about the teaching, I had a lot of reflection on the things I could have done and didn't do, how I could have taught it differently, everything (G8_ST3).

At first, student teachers focused on planning the lesson and assembling activities around the topic they had elected to work on. These activities included searching for ideas online and preparing engagement tasks based on their peers' previous experiences or spontaneous ideas from the group sessions. Given the nature of MLS, which enables student teachers to live the authentic active experience of teaching, after the research lesson, student teachers showed that what they learned had exceeded the lesson preparation itself and perceived that "the work of a teacher goes much further than simply that which is seen at the moment of

action” (Fernández; Trapero; Moreno, 2021, p. 311). Gradually, student teachers demonstrated they had realized how much class management and material preparation would impact their results:

I also realized that I had to have everything ready. I had to have the artwork on top of it and leave the paper exposed; it made our lives easier. [...] So, another thing, if there wasn't a well-structured [lesson] plan, it would not only harm me, I mean because I was teaching, but it would harm anyone who was teaching if the plan wasn't consolidated, it wouldn't work out so well. If we hadn't thought about the details, anyway (G3_ST3).

I noticed the difficulty of being in front of the classroom and teaching a class; I even put myself in the teacher's shoes and reflected that to be there, preparation, planning, and many other skills need to be developed to teach a class (G8_ST3).

[...] G2_ST3 was a bit lost because we didn't detail that in the lesson plan. [...] There was a technical glitch that could have been resolved if we had rehearsed the class beforehand and taken a look at the projector and the computer before. But then we really didn't have time to do that (G2_ST2).

I felt it was an excellent introduction to the theme, but we couldn't cover everything we wanted and show everything we wanted to show in just 50 minutes [...] But I think partly because of lack of experience on our part. Since we had never put together a class, we didn't know exactly, like the working time, whether they could absorb it quickly or not. So, we lacked a bit of that experience, and maybe [we could have] reduced the objectives for this first moment to expand this project later (G5_ST1).

I think the main adjustment would be to manage the time better. And maybe I could have brought more than just the Cordel [Brazilian regional literature] video, I could have brought a printed Cordel for them to see. I thought about it while they were doing it; they were in doubt about how to do it and where to put things. I thought I could have brought a physical copy for them to handle; it would be another resource that could be well used (G1_ST1).

Through observing and analyzing peer student teachers' microteaching, as well as teaching their own research lesson, participants concluded this inductive teaching methodology was more effective than the traditional initial teacher education they were familiar with, as reported by the study conducted by Yuan, Wang, and Liu (2023). Some student teachers claimed MLS was their first opportunity in teaching, which allowed them to attribute meaning to their soon-to-be profession.

Witnessing and experiencing this experience, both in the position of the teacher and the student, was extremely beneficial for my personal and professional development. On one hand, as a student, I briefly experienced the feeling of being a child again and not only renewed my energy but also understood a little more about the child's mind and its peculiarities; on the other hand, putting myself in the role of a teacher, I partially experienced the feeling of being in front of a classroom full of eager and curious students on various topics. I also mediated conflicts and collectively built knowledge with the class: before, preparing the lesson; during, mediating the process; and after, evaluating the work done (G5_ST1).

The class taught by G5_ST1 was very enjoyable to watch; incredible things were happening all the time... During the class, which was very interactive, all the students participated in the activities proposed by the teacher, and everything was very productive (G5_ST2).

On the day of the research lesson presentation, I felt very nervous during the presentation, a bit apprehensive about the atmosphere of the room, and not being able to develop the content. Still, I emphasized that it was not only about the atmosphere of the room but also a bit of unpreparedness on my part. I confess that I thought it would be more difficult, almost impossible, to develop this task, but with the help of the teachers, I understood that it wasn't as difficult as I imagined (G8_ST3).

G7_ST3 and G7_ST1 contributed by sharing experiences from their internship program, exemplifying the expectations of students in initial teacher education regarding their training program. This sentiment was echoed by G1_ST1, who contrasted this MLS process with a previous task in which they elaborated a lesson plan that remained theoretical and was not implemented. These perspectives are reported as follows, respectively:

I have a major in Education [Bachelor of Arts], but I had never done lesson planning in my life. When I started teaching, I didn't know how to create a lesson plan, and I didn't have anyone to teach me because teaching is like a battlefield, you know? It's teacher against teacher, so I didn't have anyone to teach me how to plan. [...] It's an experience I really didn't have during my internship (G7_ST3).

I thought this [teaching experience] should happen during the internship. I even took the internship thinking that we would have an activity where, at some point, we would be required to teach a class... but it was completely different... In practice, we just watched her [the school teacher] (G7_ST1).

What I found interesting was actually preparing the lesson plan because we had already done it once in the other class with the subject teacher. But I think we were able to make better use of it this time because we were able to put it into practice. That's what I liked... putting it into practice (G1_ST1)

Throughout MLS, student teachers drew on their prior knowledge and beliefs as they explored the use of theory toward new understandings of teaching practice. Impact on their practice was reported from little (see G2_ST2) to resolutions about being more committed to their own teacher education development (see G9_ST2 and G5_ST2 below). In the first case, student teachers were expecting the subject teacher to provide more traditional teaching practices, or the constraints of public schools limited them from adopting more active methodologies.

I believe that it [MLS] contributed superficially, as the range of resources available only really became clear after the subject teacher's class after many processes had already been carried out. [...] I would pay attention to the fact that the students don't yet fully know how to create a lesson plan (G2_ST2).

I consider Lesson Study to be a very rich learning method. We learned a lot during the process. Through the experience, I understood the importance of the methodology when creating a lesson plan and applying it in a classroom. After many conversations and exchanges of experiences, I will certainly be able to perform better in the field of education (G9_ST2).

The research and search for technology that could be used in the classroom in response to educational demands was a very important and valuable aspect for continuing my training and future teaching (G5_ST2).

Along with progressive awareness of the value of practice and experimentation, as in the excerpts reported above, the fact that some of the student teachers declined to participate in this MLS was a recurring topic. Participants viewed that refusal was in sharp contrast with progressive educational theories discussed and supported by themselves across various courses in the Pedagogy program. This perception was expressed in what follows:

Actually, I don't think there was a lack of understanding [on the part of the colleagues who refused to participate]. There was resistance to change. Truth be told, I'm quite resistant to change myself. But what about the change the colleagues always ask for? And now that it has changed, I don't understand what happened (G7_ST3).

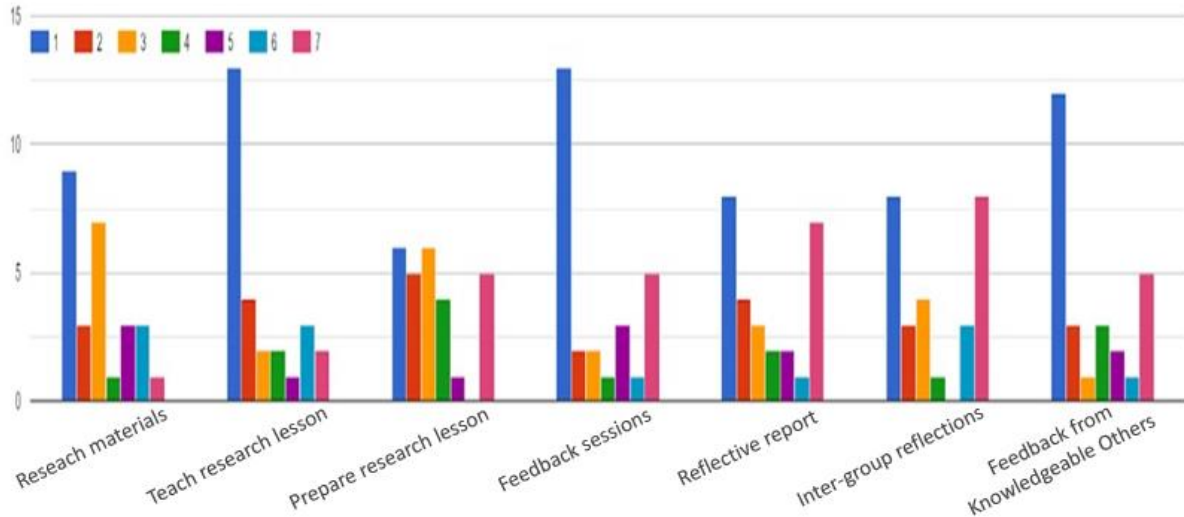
The construction of the lesson plan is a very important learning process for us future teachers, as it will be carried out throughout our teaching career. Knowing that according to Paulo Freire, "Theory without practice becomes verbalism, just as practice without theory becomes activism. However, when practice is combined with theory, we have praxis, the creative and transformative action of reality". We should deeply understand not only what we are going to teach but also why we are teaching this, at this moment and in this place (G1 Reflective Report).

7.4 Student teachers' perceptions about their learning experiences

Overwhelmingly, student teachers felt the MLS experience was a valuable one. When asked if they consider this methodology useful for other student teachers in future courses, 88.9% responded positively. Graph 1 contains a graph illustrating how student teachers ranked, in order of importance, various aspects of their learning journey throughout the MLS process, including i) researching materials and resources, ii) conducting the research lesson, iii) preparing the research lesson, iv) receiving feedback from both the researcher and subject teacher, v) engaging in reflective reports, vi) participating in inter-group reflections, vii) receiving feedback from knowledgeable others. The colors symbolize the level of importance the respondent indicated for each category. For example, in the category of researching materials and resources, nine respondents indicated it as the most relevant activity (1- blue bar), three respondents indicated it as the second most relevant activity (2 - red bar), seven respondents indicated it as the third most relevant activity (3 - yellow bar), and so on.

Graph 1 – Key aspects in the MLS learning journey according to student teachers' perceptions.

Part II – Number in order of importance the Lesson Study activity that was most relevant to you (with 1 being the most important and 7 being the least important).



Source: Reflective questionnaire generated by Google Forms.

The graph indicates that participants considered teaching research lessons and receiving feedback from the researcher, the subject teacher, and knowledgeable others as key aspects of their learning. This data revealed a complex picture of initial uncertainty, evolving into a growing consensus among participants regarding their learning supported by experienced teachers and the viability of MLS in teacher education:

Actually, it was a very enriching experience. The autonomy proposed in this course made it even more meaningful because we identified the mistakes with the teachers and analyzed where we could improve. It wasn't just a correction but rather a dialogue. After all the very important meetings, the analysis by the specialists brought even more clarity to the lesson plan, where the child is the builder of their own knowledge, and for this learning to be effective, as teachers, we must provide context to them (G9_ST3).

The methodology used throughout the course process, from the first explanations about the tasks to their conclusion with the specialists' analyses, was very beneficial. The constant dialogue among teammates and teachers, when requested, was fundamental for the development and the good results obtained (G5_ST2).

I liked the researcher's recommendations and all the support provided when we had doubts and needs (G8_ST2).

I liked the contributions from the specialists; I just didn't like the feedback being given in class because when we made mistakes, I felt a bit embarrassed in front of my classmates, but I believe that's part of it (G4_ST2).

Although similar accounts to those described above have dominated the participants' perception, this stance was not unanimous. Some student teachers expressed dissatisfaction with the lack of support they perceived. However, none of them specifically reported seeking

assistance and not receiving any. Selecting a technological resource and elaborating lesson plans proved to be a major challenge for some of them, hindering their preparation for conducting the research lesson. Additionally, participants reported feeling time pressure and recognized the necessity for interdisciplinary collaboration within the program.

I would recommend better communication with other courses in the Pedagogy program. I'd suggest having at least two classes dedicated to theory (especially focusing on how a lesson plan works and how to make one), which could also be addressed through interdisciplinary collaboration between the Media and Didactics courses. Even though it's an active methodology, I disagree that we should have to hunt for information completely on our own, especially within a short timeframe. I'd strongly recommend having experts in Early Childhood Education, as the specialists in the last meeting didn't have extensive knowledge about Early Childhood Education (kindergarten and preschool) (G2_ST3).

I didn't like it [MLS]. Additionally, we hadn't completed the Didactics course yet, so we didn't know how to prepare a lesson plan fully satisfactorily. We only had a vague impression of how to do it. Furthermore, the deadlines were too short to clarify doubts and do something really satisfactory, and the specialists' feedback pointed that out exactly (G2_ST2).

The majority of participants (96.3%) revealed that this process instigated reflections regarding the practice of teaching. These reflections resulted in increased awareness of students' individual needs and the importance of offering relevant and meaningful strategies of learning, which are less teacher-centered. This involved considering the context, experiences, and abilities of their 'future' students:

This experience encouraged me and showed me that there are other methods for inclusion and that activities can be adapted in various ways. It gave me a new perspective on how adapting activities can be easier with the assistance of technological means (G9_ST4).

[I learned] to work with accessibility; always take into account the experiences and contexts of the children; be a mediator of knowledge and provide tools for children to construct their learning; promote meaningful learning [...] (G9_ST3).

[I learned that] each student has their own learning pace, that we should consider the community where the student belongs, that we should seek all types of resources, and that teamwork is extremely important to achieve learning within the school environment (G6_ST1).

In their reflective questionnaire, student teachers highlighted their perceptions of how theory relates to the practical experiences they encountered. This was believed to be particularly significant as it suggested that some student teachers felt they could experience school-based situations, which, in their view, would help them stabilize sooner in the profession. These responses resonate with Cajkler *et al.*'s (2013, p. 550) research, which found that the LS process implemented in initial teacher education was perceived by a pre-service teacher as a significant

experience that will help her “bridge the gap and settle more quickly into teaching”. These discussions are reported in the following comments:

I liked the methodology used by the subject teacher. I believe he articulated theory and practice, allowing us to experience a bit of what happens in real classroom practice, like planning a lesson and executing it in the classroom (G8_ST3).

The relationship between theory and practice, such as in lesson planning, is significant. One thing is learning to prepare a lesson plan, but another is actually preparing it and seeing the challenges and important aspects firsthand. This was incredibly valuable for my education (G5_ST1).

I consider it essential to apply practical experience in the context of initial teacher training, even if it's simulated (as it was done) because in some cases, students who have never experienced the everyday school and classroom environment find it difficult to relate "what is written" with "what to do in the classroom" - theory and practice (G6_ST1).

Another relevant aspect was that MLS helped student teachers reflect not only on their own content learning but also on how the subject content could be experienced by their ‘future’ students. The participants focused on understanding how to make specific content easier to teach. They prioritized improving their teaching ability and comprehending the factors that could make teaching certain topics more effective and accessible.

It [MLS] introduced me to a world of possibilities of materials and teaching aids that I wasn't aware of for use in classes (G6_ST2).

I learned about media concepts related to early childhood education and realized that there's no need to keep children away from technological resources but rather to shape the type of content they consume (G8_ST2).

[I learned how to] use technology as a means for all students to learn (G2_ST4).

Understand that I can use technology as an educational method, especially to easily capture children's attention and be very didactic, as well as the need to be more inclusive (G7_ST2)

It gave me a new perspective on how technological means can make adapting activities easier (G9_ST4).

As a formative process, MLS revealed to have the potential to be effective in contributing to student teachers’ learning by researching their own practice and producing results sooner than expected. After engaging in the MLS process, G8_ST2 expressed her appreciation for the feasibility and relevance of the content studied. She enthusiastically described how her newfound knowledge was immediately applied to her teaching practice where she works at present, benefiting her students:

Children need this interaction with the virtual environment. I used this approach with my students when analyzing the alphabet. In an approach with a paper alphabet, the rate of distracted children while the spelling was higher than that of an interactive platform with a colorful and virtual alphabet (G8_ST2).

The practical experience shared by G8_ST2 is clear evidence of the authenticity of tasks perceived by the student teachers. From the perspectives shared by the majority of the participants, MLS fostered them to actively engage in crucial practices of teaching, such as planning, implementing, and modifying the lessons, experiencing processes for classroom management, identifying strengths and weaknesses for student learning, and deepening understanding of the content of teaching. Such experiences gained from the third semester of participants' initial education program revealed to have enhanced their confidence and emphasized their personal satisfaction towards their chosen profession:

The class ended on a high note with the participation of all students in building the caterpillar and choosing its name, which resulted positively in our intended interaction, promoting teamwork and socialization. Regarding setbacks such as fights and student difficulties, which can happen in an early childhood education classroom, the teacher (G6_ST1) handled them well, performing very effectively. Overall, our planning was followed and exceeded our expectations, and it was great to see it being implemented (G6_ST3).

I think one of the main reasons [why our class was a success] is that the other groups focused on topics that everyone already knew, like planting beans in cotton or geometric shapes. We came up with content that was different; at least many others, and I said they had never even seen anything like the Cordel in school. Our friend G9_ST5 even said after the activity that she really learned something she had never seen before. So, I think that's a good reason our class was a success; we taught something, and it wasn't just make-believe or play (G1_ST3).

I noticed some positive aspects, including learning, especially when we brought out the surprise box at the end. G5_ST1 said I think it was G5_ST1; he said, "Oh, I think there's a camera in there because you brought photos..." Then another person said, "Oh, it's a sticker album. It's related to the World Cup, and we saw photos. So, there's going to be a sticker album." So, it was clear that learning was happening there because these concepts emerged (G2_ST2).

So, I wouldn't say that the observer's experience was better than the teacher's feeling because, honestly, the way it was, it was very exciting. That kind of activity, that kind of class, makes you more and more interested in the program. It was really cool to witness that moment (G5_ST2).

8 DISCUSSION

The current study investigates whether engagement in MLS, guided by the CCM approach, facilitated collaborative learning and practical experiences related to inclusive education among student teachers. While acknowledging the inherent challenges of MLS, student teachers recognized and documented the nature of their learning and specific teaching perceptions that emerged from their participation in this study. This led the researcher to examine the particular aspects of the MLS process that contributed to their development or hindered their learning. The research findings will be used to analyze and discuss the proposed research questions.

8.1 In what ways do student teachers perceive their learning process utilizing MLS and the CCM approach while engaging in a collaborative and reflexive approach?

8.1.1 Enhanced knowledge of the lesson and in the lesson

During the MLS experience, student teachers had the opportunity to reflect on the lesson they had provided, revise their proposal, and consider how they could improve it for better results in the future. The findings demonstrated that engaging in reflection and deliberation on their MLS research lesson within their respective cohorts provided student teachers with avenues for learning by exploring alternative perspectives, gaining new insights, and reframing occurrences or challenges encountered within their learning process.

In this study, the results indicated that student teachers developed knowledge across various perspectives through MLS. Some participants expressed they lacked familiarity or understanding of the subject matter they were teaching. Engaging in their MLS groups and observing their peers' lessons enabled them to think more about strategies for integrating technological resources into their teaching practices and how to plan the content according to their students' context, interests, and needs. While MLS is focused on helping student teachers foster content and pedagogical content knowledge (Fernández, 2005), this methodology aligns with the principles of the CCM approach, in which teaching is conceived from the students' context and experiences (Schlünzen *et al.*, 2020).

Increased knowledge of instruction was also observed as student teachers carefully wondered how they could have involved their peer students, making them more curious and engaged. One participant reflected that the success of their lesson was connected to the interest they sparked in their peer students. This knowledge goes 'beyond the particular lesson and subject matter' (Lewis; Perry; Hurd, 2004, p. 19) and is conducive to enhancing motivation and a sense of efficacy (Schipper *et al.*, 2020b).

Instructional knowledge was also perceived when the student teachers recognized the importance of developing detailed lesson plans and organizing resources before conducting lessons. Indeed, the participants realized that teaching extends far beyond what is performed during the lesson itself (Carrier, 2011; Fernández; Trapero; Moreno, 2021). What experienced teachers might perceive as obvious was actually a revelation for the participating student teachers. Although instructional knowledge is critical for teaching (Fonseca; Ponte, 2022; Leavy; Hourigan, 2016; Pan; Hung; Bai, 2023; Perry; Lewis, 2009), similar findings can be observed among in-service teachers. In an LS conducted with seven in-service teachers with 6

to 15 years of experience in teaching mathematics in basic education in Portugal (Richit; Ponte, 2020), participants highlighted aspects that led them to value lesson planning as a means to better prepare for classroom teaching and the opportunity it provides for deepening the subject matter to be taught.

This aspect suggests that integrating MLS into initial teacher education programs holds promise for equipping novice teachers with the foundational skills needed as they enter the profession. It aligns with the initial phase of the teacher's professional journey outlined by Nóvoa (2014), potentially mitigating what the author describes as the 'shock of reality'. This includes challenges such as managing classroom dynamics and addressing potential deficiencies in teaching materials, which new teachers often encounter. It goes without saying that LS and MLS do not have the answers to solve all the problems in initial teacher education (Cardoso; Da Ponte; Quaresma, 2023). However, it favors the idea Nóvoa (2009, p. 2) defended in this research: "the need for teacher training constructed within the profession itself."

8.1.2 Enhanced stronger sense of collegiality

Throughout the MLS experience, the processes of collaboration and reflection were perceived as highly significant for the development of student teachers. The findings suggest that actively engaging in collaboration and reflection on their MLS research lessons within group settings and the support of teachers and specialists offered student teachers valuable opportunities to explore diverse viewpoints (Ylonen; Norwich, 2012), acquire fresh perspectives (Calleja; Formosa, 2020; Cardoso; Da Ponte; Quaresma, 2023), and reframe events or challenges within their lessons (Fernández, 2010; Fernandez; Robinson, 2006).

Student teachers seemed to be constructing their knowledge through the collaborative development and implementation of their lessons, which were designed according to their interests. Participants engaged in every aspect of the process, including planning, teaching, observing, analyzing, and revising the lesson. They contributed more prominently to aspects they perceived as more aligned with their skills or personal preferences, in accordance with the CCM approach to group work outlined by Schlünzen *et al.* (2020).

The support that student teachers felt from other MLS groups as they presented their lessons was pointed out as a benefit of teaching the lesson in a safe and trustful environment. This aspect is commonly reported in the literature as intergroup support in MLS implementations (Carrier, 2011) rather than support from outside group members. Participant teachers found that collaboration among their peers provided them a sense of ownership of the

improvement effort and shared responsibility for teaching (Lewis; Perry; Hurd, 2009). Furthermore, as the observation focused on the ‘student peer learning,’ not on the performance of the student teacher, the MLS process motivated participants to what Dudley (2012, p. 91) described as the courage of “risk-taking and learning from what does not work as well as what does work.”

As described in the literature on LS, collegial networks can facilitate teachers in routinely sharing resources and ideas (Lewis; Perry; Hurd, 2004) and encourage student teachers to break away from the “individualistic and competitive culture with which they usually enter initial training” (Sepúlveda; Gallardo; García-Vila, 2022, p. 37). This is supported by Cajkler *et al.* (2015), who stated that collaboration in LS reduced feelings of professional isolation among seven in-service secondary-school teachers, leading to effective professional learning and helping develop newly qualified teachers.

In this research, collegial bonds were strengthened through engagement in MLS. Participants reported that this experience allowed them to collaboratively improve their teaching skills and increase their confidence in teaching. Furthermore, the participants demonstrated a disposition to embrace new teaching approaches and future collaboration during their in-service practice. This indicates that a research lesson does not end after teaching the lesson, confirming that “the interpersonal bridges built during lesson study enable collaboration well beyond the research lesson, increasing the coherence and consistency of the learning environment” (Lewis; Perry; Hurd, 2004, p. 20).

8.1.3 Enhanced confidence in teaching

Before the MLS experience, the student teachers had already had the opportunity to discuss readings and analyze progressive educational theories and written lesson plans in different courses of their Pedagogy program. However, student teachers in this research have limited teaching experience. MLS provided a safe context for them to practice teaching as they considered ways of incorporating ideas from the course into their lessons and, in some situations, confronted the studied theories to the experience they lived.

When student teachers realized that the purpose of MLS was not to deliver flawless lessons (Chokshi; Fernandez, 2004; Lewis, 2016; Murata, 2011; Takahashi; McDougal, 2016) or assess their teaching proficiency (Cajkler; Wood, 2016b; Lewis; Perry; Murata, 2006), but rather to promote collaborative learning through reflective practices (Gómez; Núñez; Caparros-Vida, 2016), their anxiety decreased. The initial feeling of anxiety experienced by student

teachers in this research is also recorded in other studies. In Cajkler *et al.*'s (2013) research, prospective teachers found the context of observation experienced in MLS was less intimidating than previous experiences, leading to reduced feelings of anxiety and, as a consequence, higher levels of confidence. In accordance with this perspective, participants in Griffiths's (2016) peer MLS reported feeling more confident teaching non-specialist subjects. Moreover, they expressed enhanced readiness for their initial teaching positions, which may entail instruction across diverse subject domains. Furthermore, participation in peer MLS facilitated their comprehension of interconnections among various disciplines within the humanities. These results are further justified by Schipper *et al.* (2020b), who explain that when teachers gain more confidence in performing a specific type of teaching behavior, their attention tends to shift towards enhancing correlated teaching activities.

Therefore, not surprisingly, the findings in this research demonstrated that, as their confidence beliefs grew, student teachers voiced satisfaction with the knowledge acquired through their involvement in MLS. From this perspective, MLS served as a methodology for preparing student teachers for teaching practices and bolstering their beliefs in their own capacity. This implied deeper changes in attitudes and dispositions to engaging in practical learning activities and corroborated the findings in the research conducted by Sepúlveda, Gallardo, and García-Vila (2022). In their study, student teachers collaborated with tutor teachers to design and implement LS to reconstruct their practical knowledge. The results indicated that student teachers experienced satisfaction as they noticed they could refine their initial designs collaboratively, anchoring them more closely to their educational objectives.

Another aspect that contributed to enhanced feelings of confidence and satisfaction is collaboration, a critical aspect of LS and MLS practices (Cajkler *et al.*, 2013; Dudley, 2013; Yuan; Wang; Liu, 2023), as discussed above. In this research, student teachers were required to exercise "two roles: school students and future teachers," as documented in Zhou and Xu's (2017, p. 243) MLS implementation. Participants in that study revealed they did not know they could deliver a lesson; some mentioned they were shy, while others declared they lacked teaching experience. A recurring conclusion was that they were proud of the outcomes of their work, which, in turn, instilled in them an assurance of their professional choice and distinguished value in the Pedagogy program. A recently published report by Richit, Ponte, and Tomkelski (2019, p. 74) confirmed that collaboration in LS enabled "participants to transcend the established training culture [...] to attribute new value to teacher training processes", following a sense of confidence in understanding central elements of the lesson.

At this point, it becomes clear that the combination of satisfaction and more substantial confidence contributed to student teachers' disposition to take risks with new teaching approaches, showing a willingness to engage in breakthrough methodologies and move away from teacher-led approaches (Cajkler *et al.*, 2015). These results were only possible because participants experienced MLS opportunities in collaborative work tasks to solve teaching problems whilst connecting theory and practice (Fernández, 2005; Griffiths, 2016; Leavy; Carroll, 2013). In this sense, participating student teachers showed improvements in their lesson planning. They consisted of reflections on their content and instructional knowledge, including demonstrating a greater understanding of lesson management, more knowledge-based reflections on what could work better, the value of a well-detailed lesson plan, the importance of the context in engaging students in the lesson, and analyzing whether their proposed inclusive lesson reached its objectives.

8.1.4 Enhanced concerns about the effectiveness of MLS and the challenges faced

Notwithstanding the benefits the participating student teachers reported, this MLS implementation revealed emerging concerns that must be addressed. Participants wrote in their individual reflective reports:

[...] Preparing the lesson plan was an extremely exhausting and stressful task, as we didn't know whether to start from the content, the objectives, etc., and we didn't even know exactly how to do them properly (G2_ST2).
 I liked the experience, but I found it a bit difficult and with few explanations on how to carry out the activity (G9_ST1).
 [The hardest part was] researching a suitable technology [resource] for my age group and being able to use it in our lesson plan (G9_ST6).

The idea that student teachers find LS and, more specifically, MLS too difficult and even impossible for inexperienced participants, as acknowledged by some student teachers, is not new (see Cajkler; Wood, 2016c). This notion aligns with the perceptions of prospective teachers recorded in Sepúlveda, Gallardo, and García-Vila's (2022) study on LS implementation. Initially, the authors reported that the unfamiliarity with the proposed methodology caused disorientation and confusion among participants. However, this disorientation transformed over time into the active reconstruction of their experiential knowledge through practical engagement. This process facilitated reflection on their actions and fostered the development of essential professional competencies vital for their initial teacher training. Consistent with this finding and the literature discussed previously, Fernández,

Trapero, and Moreno (2021, p. 310) documented that, in the beginning, student teachers participating in an LS cycle for the first time experienced feelings of fear, uncertainty, insecurity, and chaos, which proved that “LS is a training strategy that takes students outside their comfort zones and allows them to start questioning their own practical knowledge, contrasting it with the cooperative experiences lived in authentic tasks”.

Another concern acknowledged by some student teachers was the need to develop MLS in conjunction with other subjects within the Pedagogy program, as noted in the following student teachers’ reflective report:

I think it's important to have better communication between the different courses at the university. For instance, while we were working on the lesson plan required for the Media class, we hadn't covered it yet in the Teaching Methods class. However, after working on the theory and practice of lesson planning in the Teaching Methods class, it became clearer and simpler, making our Lesson Study process “smoother” (G2_ST3).

The deepened knowledge and understanding were better utilized towards the end because they were integrated with other courses from the semester. However, I don't think they were fully utilized, and they seemed a bit confusing at the beginning (G3_ST3).

Indeed, LS is not “a one-time-single lesson” (Lewis; Perry; Hurd, 2004, p. 20) or a finished product (Lewis, 2016). Its value extends the lesson and the subject matter and, therefore, would perfectly suit a transdisciplinary approach. In this respect, Lewis (2000, p. 5) argues that the aim targeted in research lessons is usually “a broad goal or vision of education that goes beyond a specific subject matter and lesson.” She explains that a particular topic researched from a certain perspective could be revisited in a different context because what is being practiced is not the content itself. In other words, LS allows teachers to contextualize their classroom activities while making their tacit knowledge and practices explicit through collaborative discussions (Fujii, 2016).

Hence, understanding the demands of student teachers within this research is a justified inquiry worthy of exploration. We posit that integrating MLS in a transdisciplinary framework could encourage greater participation from teacher educators, thereby contributing to the sustainability and upscaling of MLS practices. In this way, the opportunity to teach the research lesson could be extended to all participants. This is supported by G5_ST4, who said, “I would like to have had the experience of teaching a class myself. However, it was interesting to observe from the outside and see the lesson and the students”. Furthermore, encompassing MLS across various disciplines would have helped student teachers overcome the traditional “theory-practice binomial” (Soto; Serván; Pérez, 2015, p. 67).

Previous empirical LS implementations have found that by observing how students acquired learning during the research lesson, prospective teachers developed knowledge about students' difficulties and solving strategies (Cardoso; Da Ponte; Quaresma, 2023), fostered teacher candidates' self-efficacy in teaching (Schipper *et al.*, 2020b) and increased awareness of student needs, as well as their abilities, contributing to inclusive education (Aas, 2020). Whereas the literature highlights LS and MLS to be beneficial for the teachers to learn how to observe students (Aas, 2021; Cardoso; Da Ponte; Quaresma, 2023; Lewis; Perry; Hurd, 2004), findings in this research demonstrated that some student teachers struggled to observe how their peer students gained knowledge. This difficulty was commented on during the reflection sessions and in their written reflective reports. G3_ST1 stated, "we didn't observe their [peer students'] learning, but ours." This is clear evidence that the complexity of teaching and the need to understand how students learn takes practice and further efforts in teacher training (Griffiths, 2016; Lamb, 2015; Nóvoa, 2022). However, it is notable that not all participants perceived the same. For instance, when student teachers attributed the success of their lesson to peer students' engagement and learning something they did not know, or when they highlighted that a student with SEN was not adequately addressed, participants demonstrated their evolving ability to read the classroom, echoing the findings reported in Ainley and Luntley (2007).

The originality of this study lies in its demonstration of how the integration of LS and MLS within the initial teacher training can emphasize a comprehensive understanding of the teaching profession (Danday; Monterola, 2019; Schipper *et al.*, 2020a; Yuan; Wang; Liu, 2023; Zhou; Xu, 2017). However, this methodology demands time and, importantly, a readiness to participate in critical conversations regarding teaching practice (Baumfield *et al.*, 2022; Cajkler; Wood, 2016a; Gómez; Núñez; Caparros-Vida, 2016; Pan; Hung; Bai, 2023). Prospective teachers in Leavy and Houriga's (2016) research acknowledged the lack of time associated with other pressures and deadlines during college as a challenge while implementing LS. Likewise, participants in Schipper *et al.*'s (2020b) LS in initial teacher education argued that available time for collaboration, clear scheduling arrangements, structural conditions, and commitment to the process are pivotal aspects of a successful LS application. This finding is corroborated by a recent international review conducted by Fluminhan, Schlünzen, and Schlünzen Junior (2024), which highlights that time constraints, alongside financial support, the pursuit of immediate results, and the involvement of knowledgeable others are key factors when implementing LS across various contexts.

In compliance with prior literature, student teachers in this study claim that their learning would have been deeper had they had more dedicated time to engage and reflect on

the process, as indicated by participants previously. In this respect, G2_ST4 adds an important feature that is likely to be unprecedented in the literature:

It was an interesting and important teaching course, as it helped us prepare a lesson plan and teach and analyze the moment. However, it was a bit confusing for me because of the canceled classes due to the World Cup and the end-of-year break (G2_ST4).

A cultural aspect locally observed is that when the Brazilian team plays in the Soccer World Cup, the country officially “stops” to watch the game no matter what time it is. Therefore, besides the short time we usually face in university programs, another constraint was added to this implementation. This also explains why a great number of online meetings were scheduled.

Learning through MLS seemed particularly challenging for student teachers lacking prior experience in academic and professional collaborative environments before being introduced to LS. Engaging in such a new and unknown teaching methodology could hinder their active involvement in the process (Cajkler; Wood, 2019). Findings in this research revealed that whereas some student teachers felt supported by the researcher, subject teacher, and knowledgeable others and appreciated the autonomy experienced during the MLS process, others struggled with abandonment and isolation. Furthermore, some participants argued they expected the subject teacher to tell them which educational technological resources were available and how to use them, such as in G9_ST1’s contribution: “We didn’t learn which technologies are best for each age group, nor how we can use technologies in classes.”

In this regard, Cajkler and Wood (2019) signal the ultimate approach formulated in practicum-based studies involves eliminating the requirement for a school-based mentor or supervisor entirely. Lamb (2015), for instance, developed LS practices, which were identified as a peer-learning model, with pre-service teachers completing the LS cycles by themselves, beyond formal mentoring. The research indicated that autonomy and ownership contributed to favorable outcomes, as participants gained confidence in learning from peers. This was especially evident in their acquisition of subject knowledge, refinement of planning skills, understanding of learners' needs, and integration of reflective practice as they collaborated in planning, teaching, observing, evaluating, and discussing lessons. The “thin line which separates appropriate support and accompaniment, to ensure students follow their own path, and excessive intervention, which can stifle students’ autonomy” (Gómez; Núñez; Caparros-Vida, 2016, p. 126) is a topic that merits further research.

Another disturbing issue voiced by student teachers regarding their experience involved teaching fellow peers instead of conducting lessons in actual school settings. As one student teacher said:

I think my biggest challenge was the organization issue; we didn't have time to detail it, but it was also the issue of adults imitating children. And that really threw me off because I think that's terrible. So, that made me a bit apprehensive because adults are very different from children, right? And the way they judge our work is also different. But overall, I think we achieved the goal. I think we did what was possible during our time, considering the week's demands, which were packed with things to do (G2_ST3).

The same student teacher also stated:

[...] I felt that the students really achieved the objectives we wanted. Despite everything, they participated in the game. They were interacting with each other because when the image appeared, they were talking among themselves [...] (G2_ST3).

Although most participants perceived MLS positively, the results validate the ongoing debate surrounding the efficacy of microteaching. He and Yan's (2011) study revealed several positive aspects of microteaching, including the supportive environment created by peers, the constructive feedback provided by both instructors and peers, and the collaborative atmosphere fostering professionalism. Notwithstanding, their research also highlighted several drawbacks, such as the lack of authenticity due to simulated classroom settings and student interactions, insufficient feedback from experienced teachers within school contexts, and limited opportunities for enhancing pedagogical skills and competence.

Despite being seen as artificial in some studies (Cajkler; Wood, 2019; Carrier, 2011; Murata *et al.*, 2012), MLS proved to enable prospective teachers to experience authentic active learning while planning and delivering actual teaching activities (Fernández, 2005, 2010; He; Yan, 2011; Lamb, 2015; Yuliani, 2018; Zhou; Xu, 2017). By the same token, the results in this research made explicit the positive experience perceived by most student teachers. I invite the reader to hear what these participants had to say:

The teacher adapted the activity for the visually impaired student, who was able to participate along with everyone in the class. The class had a lot of fun. The activities happened within the expected timeframe. During the activities, there were some instances of bullying towards students with special needs. The teacher addressed and corrected the attacks by stating it wasn't nice to do that to a friend. There was one situation that the teacher didn't see (G6_ST2).
So, I thought the only thing that happened to G6_ST1 is what happens in real life because there are few caregivers for students with hearing impairment. The teacher

has to deal with 30 students and find a way to include the students with disabilities all at once (G5_ST4).

The excerpts above portray an authentic teaching experience wherein the complexities of teaching were well exposed. So realistic, robust, and meaningful was the teaching activity for a significant number of student teachers that a participant introduced some of her learning outcomes in the lesson she currently teaches at work. Had MLS not been regarded as an authentic and practical teaching activity, comments such as the one reported by the student teacher (G8_ST2) applying what she had learned to her actual teaching practice would have been implausible.

While proponents of MLS described the benefits and recognized constraints of this methodology (Fernández, 2005, 2010; Yuan; Wang; Liu, 2023; Yuliani, 2018; Zhou; Xu, 2017), what seems to be a consensus is that relying solely on microteaching would be insufficient in adequately preparing student teachers for real-life school teaching environments, primarily because of the simulated nature of students, classroom dynamics, and the absence of engagement from school teachers (Fernández, 2005; He; Yan, 2011). In Marble's (2006, p. 94) words, "as an isolated experience, it [LS] is insufficient to result independently in the growth of the participants' researcher lenses or influence their long-term perspectives on their professional growth as teachers." Indeed, there is no one solution to all initial teacher training demands (Cardoso; Da Ponte; Quaresma, 2023; He; Yan, 2011; Kotelawala, 2012).

In this respect, Allen and Eve (1968, p. 182) claim that in-service practice also presents significant constraints:

(1) students are there to be taught, not practiced on, (2) practice of a specific skill or technique must fit well within a longer lesson specified for that particular day, and (3) there is only limited opportunity to receive feedback on the skill which is practiced.

In other words, other challenges can occur even when teaching practice is developed in a school-based setting as the only valid teacher education strategy some researchers advocate.

In Brazil, for instance, Pedagogy student teachers have to complete their internship program in pre and elementary school settings. However, they usually observe lessons and write reports, a format criticized by participants in the aforementioned excerpts. One may suggest that an LS mixed group formed by student teachers and in-service teachers would overcome the alleged problem of MLS's lack of authenticity. Nevertheless, the findings documented in Tsui and Law's (2007) study proved the contrary. In that study, student teachers expressed negative evaluations regarding collaborating in a mixed-group setting within a school-

university partnership. The collaboration involved student teachers, experienced school teachers, and university tutors while engaging in a new activity system mediated by LS. The student teachers perceived an unequal power relationship within this setup, which they felt hindered the development of their professional autonomy and sense of ownership of their work. Furthermore, student teachers argued they had been subjected to severe and unfair criticisms, asserting they lacked adequate time and opportunity to reflect on suggestions for improvement and full comprehension of the lesson.

This being said, and considering the complexity of initial teacher education, any claims made must remain prudent and transitional. It is imperative to consider all variables before making rushed judgments that could potentially undermine the possibility of successful outcomes. Adding on Fernández (2005; 2010), Marble (2006), and He and Yan's (2011) view, the results in this research are indicative that MLS is a fruitful methodology to be used in conjunction with other initial teacher education methodologies, capable of capturing essential and authentic aspects of the complexity of typical classroom practice in a holistic, transdisciplinary framework, considering participants' context, skills, interests, and strengths, while also valuing their voices.

8.2 How can MLS and the CCM approach contribute to student teachers' learning regarding the practical aspects of inclusive education?

8.2.1 Enhanced awareness of student's context, interests, and skills

In this research, participants experienced learning in three distinct positions. They were students enrolled in an undergraduate Pedagogy program, seeking certification to teach at the pre and elementary school levels. At the same time, during the MLS process, they acted as teachers responsible for planning and delivering the research lesson and as peer students for the other groups. In each of these positions, participants experienced learning and teaching according to the principles of the CCM approach.

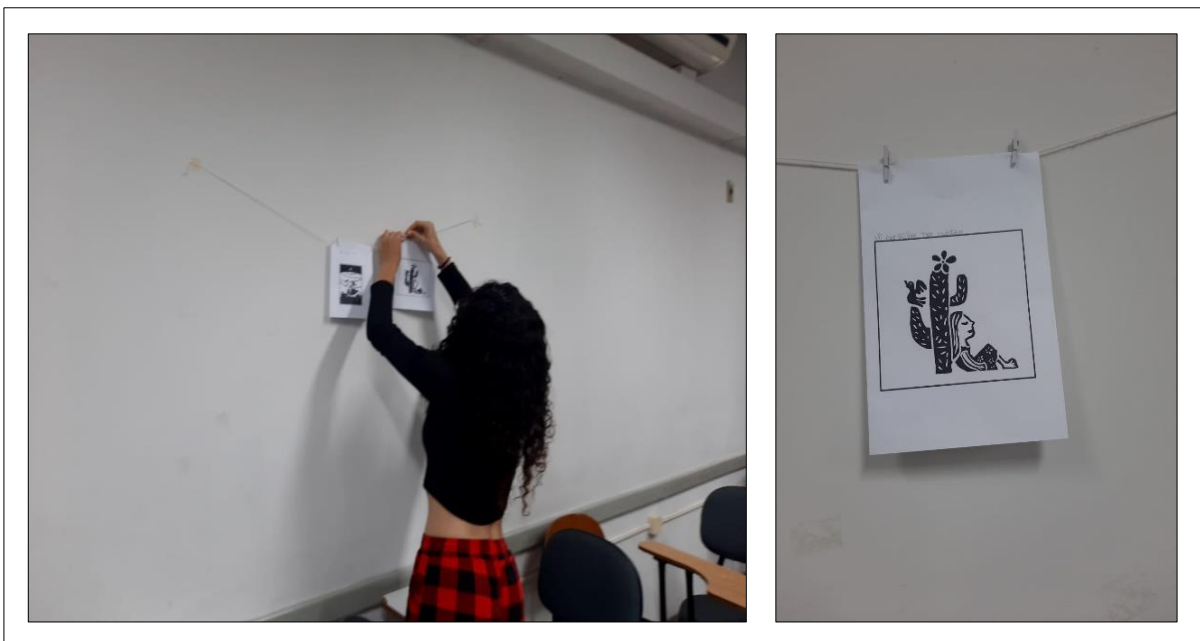
As students of the university program learning in a constructionist environment, participants could actively engage in planning and demonstrate a tangible resource through research lessons and class plans while experiencing deeper levels of learning through authentic teaching tasks. MLS groups were free to decide what subject content, school level, technological resource, and specific features of the students they wanted to research and teach.

While acting as teachers, participants planned their lessons focusing on their ‘students’ (peer students’) interests.

As previously documented, most student teachers enjoyed the autonomy to create lessons tailored to their own interests. Simultaneously, each group carefully planned activities for their peer students to experiment with learning by creating a resource related to the lesson's theme. From an inclusive perspective, research lessons were designed to teach not only students with SEN and disabilities but all learners, valuing diversity and providing support for each individual (Goei; Norwich; Dudley, 2021).

For instance, G1 proposed that peer students work in small groups to compose a stanza in the style of the Brazilian regional literature called Cordel, which was studied during the research lesson. Student peers then read their stanzas aloud and produced a cover for their written work inspired by the landscape of the same region (Figure 3). The group members collaborated according to their own skills, and their abilities were acknowledged as valuable contributions to the activity.

Figure 3 – Peer students displaying artwork inspired by the regional Brazilian literature called Cordel.



Source: The author (2024).

G3 proposed that their peer students (‘preschoolers’) produce a collaborative giant panel using paint, cotton balls, and other materials to illustrate the story discussed in the research lesson. While working on this panel, peer students shared their understanding of the

story, connected its meaning to their artwork, and reflected on what they had learned (Figure 4).

Figure 4 – Peer students collaboratively construct a large panel to illustrate the story's setting discussed in the research lesson.



Source: The author (2024).

Another example comes from G6, who suggested that their peer students (preschoolers) create and name their own mascot. They created an enormous caterpillar using the circular geometric shape discussed during the research lesson. In Figure 5, the first scene depicts a ‘blind student’ (a peer student wearing a blindfold) participating in constructing the caterpillar. In contrast, the second scene shows the final work and its chosen name on a green board.

Figure 5 – Peer students constructing their learning resource and their final work disposed of in the classroom.



Source: The author (2024).

With a focus on providing an inclusive lesson, G6 acknowledged not all peer students received due attention and opportunities. This unexpected result instigated reflections and led participants to develop solutions to improve future lessons, and their perceptions and suggestions were considered and valued. While being prepared to become inclusive teachers, participants could experience their own learning in an inclusive environment as they dealt with practical and speculative problems and issues relevant to their group. Student teachers were, therefore, engaging in constructing a more flexible, creative, autonomous, student-centered education and overcoming the traditional top-down, pre-organized, and uniform model of instruction. According to Lanuti and Mantoan (2018), understanding that learning concerns how the learner responds when challenged, encouraged to go beyond what they already know, how they navigate through new meanings, recognize them, reshape them, and expand upon them favors the inclusion of all students.

The MLS methodology allowed participants to contextualize the learning and difficulties that emerged in the classroom activities while making their implicit knowledge explicit through collaborative interactions (Fujii, 2016). In line with Aas (2020) and Schipper *et al.* (2018), this experience also instigated student teachers to gain awareness and insight into

their ‘students’ needs, ensuring equal conditions and possibilities of participation during the research lessons, a precondition to inclusive teaching (Norwich, 2002; Schlünzen *et al.*, 2020).

These findings indicate that student teachers participating in the study were able to offer their ‘students’ (peer students acting as students) opportunities to create tangible and relevant learning resources while developing activities. In this ‘contextualized constructionism,’ as Valente (2005) explains, peer students engaged in building meaningful resources related to their realities or pursuits. This work expanded to encompass affective and evaluative dimensions (Schlünzen *et al.*, 2020). Despite being in a simulated setting, the participants experienced the process of real active teaching in which the learner constructed meaning through active engagement with the lesson and their surroundings. Therefore, participants benefited from the principles of MLS as they integrated theory and practice from an inclusive perspective, as Schlünzen *et al.* (2020) advocated, transforming the learning and teaching processes and ultimately enhancing their pedagogical skills.

The constructionist notion of learning as an active process “goes beyond (while including) the idea of hands-on” (Papert, 1986, p. 9), as emphasized by the CCM approach. According to this approach, learning should not be disconnected from the learner’s interests or solely focused on the activity for its own sake. Instead, learning has to be experienced as something the learner believes is important and valuable for them. In this regard, Papert (1986) identified affective, aesthetic, and socio-cultural dimensions as critical learning factors. Furthermore, the author underscored the significance of developing a passionate connection with the content matter, citing Einstein’s belief that “love is a better master than duty” (Papert, 1986, p. 10).

As detailed in the preceding sections, the MLS methodology employed in this study allowed the student teachers to cultivate a sense of satisfaction and ownership in their work since they engaged in the stages of designing, teaching, observing, reflecting on lessons, and collaborating with peers and mentors, fostering a comprehensive learning experience. This idea of creating an artifact that is produced from the learners’ context and perspective and, therefore, meaningful to them is the core aspect supported by the CCM approach (Schlünzen *et al.*, 2020). The innovative contribution to the field of teaching education is found in the integration of MLS into the CCM approach. This approach argues that effective education is only possible if it is permeated by the understanding that education is a right to all.

In a contextualized learning environment, groups based their proposed research lesson on their previous experiences and backgrounds, leading them to share individual prior knowledge and experiences. As a result, participants demonstrated that their construction path

was relevant and immersed in their curiosity to learn more. In the MLS practices, student teachers could mirror their experience of learning to their work as teachers; that is, they showed an increased perception that a successful lesson is one that would challenge their learners' curiosity as well and allow for equal opportunities for engagement for all (Schlünzen *et al.*, 2020). Participants developed “a growing view of learning as something students construct themselves through active participation” (Aas, 2020, p. 12), as advocated by the CCM approach.

MLS facilitated active participation among student teachers, demonstrated in practice and planning, as evidenced in various reported experiences. Additionally, it promoted meaningful discussions among them. In a meaningful learning environment, throughout the process, discussions among the groups led to the emergence of doubts, questions, and difficulties. At this moment, underpinned by the CCM approach, the subject teacher, researcher, and knowledgeable others mediated the process by helping them reflect on the challenges encountered and supporting the construction of new, formal, and meaningful knowledge. At this stage, it became evident that student teachers could relate their practice to the educational theories they studied. Furthermore, student teachers could collaboratively contribute to the knowledge-building process according to their skills and interests.

With this idea in mind, activities were designed for all peer students to build their own knowledge and create their own learning while planning the lesson. This implies that when student teachers developed a broader understanding that inclusive education is attentive to student needs (Aas, 2020), they demonstrated a shift towards regarding teaching and learning as a social phenomenon (Dudley, 2011), in which the active and meaningful involvement of peer students served as a valuable resource for the lessons.

As ‘teachers’, participants understood the importance of providing a meaningful environment for their peer students. The findings describe their attempt to transition from conceiving students “as passive recipients towards active participants” (Aas, 2020, p. 12) socially and contextually situated. It was possible to identify that the notion of inclusive education represented a change in how student teachers perceived teaching practice and student learning. Understanding and, more importantly, applying the concept of inclusion was a critical factor for this change.

This study demonstrated that, overwhelmingly, student teachers developed new insights into how and why their teaching approach directly influences learner outcomes. This is consistent with Aas's (2020) findings, which suggest that when teachers develop their understanding of students, themselves, and their work, it can lead to inclusive education. These

newfound insights enabled student teachers to project future actions (in the classroom and beyond), helping them develop their teaching identity. As noted in the reported excerpts, the MLS process guided by the CCM approach supported teachers in moving towards inclusive education, demonstrating that these aspects can be seen as values that transcend the dimensions of ability and disability (Norwich; Benham-Clarke; Goei, 2021). Indeed, SEN or disabilities represent just one facet of the broader diversity embraced within inclusive education (Schlünzen *et al.*, 2020).

9 CONCLUSIONS AND IMPLICATIONS

This study examined the implementation of MLS within an initial teacher education program with support from the CCM approach. Its objective was to investigate collaborative learning and practical experiences focused on promoting inclusive education in a Pedagogy program at a public Brazilian university. The study involved 33 student teachers organized into nine MLS groups. Considering the difficulties of introducing a new teacher development methodology in the context of initial teacher education at the university, data were generated from various procedures along ten distinguished steps.

The results suggest that student teachers experienced several enhancements: (1) improved knowledge about lesson planning by integrating technological resources to address student needs and interests while reflecting on ways to enhance learning outcomes; (2) deepened understanding of teaching complexity and reconsideration of prior teaching knowledge; (3) fostered a stronger sense of collaboration through peer learning and support, promoting a safe and trusting environment; (4) increased confidence, satisfaction, and ownership through authentic teaching experiences; (5) heightened awareness of student needs, contexts, interests, and skills by observing successful and unsuccessful strategies within their peer students' realm; and (6) gained awareness of the critical factors influencing learning, particularly the interconnectedness of theoretical teaching practices and inclusive educational principles (Schlünzen *et al.*, 2020).

However, and despite the above, some participants voiced challenges in transitioning from a traditional teaching and learning culture to a more progressive approach. Difficulties were perceived related to understanding the MLS process, lack of experience in lesson planning and teaching, collaboration with peers, feelings of isolation, and insufficient content knowledge. Research results also suggested that MLS for the training of student teachers should be articulated with other courses, and teaching research lessons should be extended to all

participants to help them better experience the teaching practice. Regarding the methodological procedure, MLS was criticized for its unrealistic teaching context. These barriers led to frustrations and reduced engagement among some participants.

Much has been said about the inefficiency and inadequacy of initial teacher programs to support training activities to prepare student teachers for their future professional practice. The innovative design of this study intends to address this issue by proposing new avenues for improvement. This study does not consider MLS a limited or superficial format for initial teacher training. Conversely, MLS offers a less costly and perhaps most advantageous productive way of engaging student teachers in the practice-based, action research process that can foster real teaching experience from the early stages of teacher preparation. Within the university programs, articulating the CCM approach and MLS can enable student teachers to develop a deeper understanding of student learning and, in doing so, enhance their understanding of how to become inclusive teachers. The original aspect of integrating MLS and the CCM approach resides in the particular emphases highlighted by the latter, which presupposes that effective education must acknowledge education as a fundamental right for all.

Therefore, MLS is seen as a strength in this proposal, as it allowed student teachers to experience the initial idea of how their future profession is developed and allowed them to start developing their teacher identity towards inclusive education. The student teachers performed authentic teaching. After all, they were not delivering a seminar, attending a workshop, or developing a portfolio. They designed and taught a lesson. The setting, however, was not of a real pre or elementary school. We argue that the mandatory training program currently offered at national universities, which is focused on observing in-service teachers teach their lessons totally disconnected from student teachers' involvement and lacking the actual teaching experience, could be considered more artificial and simulated than the methodology implemented in this research.

Arguably, no methodology alone could provide all the pivotal experiences to prepare a student for what is to come. In this regard, the focus of our stance is not to overlook MLS gaps. It is, however, an invitation for teacher educators, university programs, and public policies not to be distracted by what MLS cannot offer student teachers. Instead, it calls for educational professionals and stakeholders to benefit from what this methodology can provide.

In this sense, MLS is presented as an effective alternative or complementary methodology that can and should be adopted in initial teacher education to investigate and develop theoretical knowledge and practical skills to prepare student teachers for successful

careers in education. Nonetheless, this can only be feasible if certain conditions are met, such as time and management support, the provision of a holistic and transdisciplinary collaborative learning environment, and more emphasis on the process of student-centered learning over the anxiety of quick-fix expectations relying on traditional teacher-centered approaches.

The study encountered several limitations, and caution should be taken to avoid over-generalizing the findings. MLS was conducted with only nine groups of student teachers during one semester, with involvement from only one subject teacher. Moreover, MLS is not a regular activity of the initial teacher program of the participating university. As a result, MLS remained limited to the experiences of these groups, as it was impossible to organize ways for student teachers to share their perceptions within the program. This hindered informing the local community of the perceived evidence and potential benefits of this process and a broad discussion of how to reframe it for later proposals involving more teacher educators.

Some unanswered questions prompted us to propose further investigations. Future research could be carried out with more participants, tracking them until they complete their first cycle of in-service teaching. This could shed light on how MLS and the CCM approach influence their education and shape their entry into the teaching profession. Unfortunately, the role and the specific influence of knowledgeable others in this research could not be thoroughly investigated because student teachers could not be reached for further discussions after the feedback session. Given this constraint, it is crucial to gain a deeper understanding of how student teachers perceive their final comments and how to support the preparation of these professionals in a context new to LS and MLS.

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10 FINAL THOUGHTS AND PERSPECTIVES

Incorporating the CCM approach, articulated with the LS methodology, highlights my interest in collaborative and reflective methodologies that bridge theory and practice. This emphasis on inclusive education underscores my goal of making teaching and learning practices more accessible and effective for diverse students, with a special focus on initial teacher training. Therefore, my research trajectory was guided by the following central thesis: implementing the CCM approach in conjunction with the LS methodology, which holds the potential to enhance the initial training of teachers in Brazil and foster more collaborative, meaningful, and inclusive educational practices.

In this regard, my research journey sought to analyze the process of creation, implementation, and evaluation of a proposal for the initial teacher education of Brazilian Pedagogy students, as well as explore how the interconnectedness of the LS methodology and the CCM approach can effectively promote meaningful, collaborative, and inclusive educational practices. As advocated by the CCM approach, this research investigated inclusion not through the lens of disability but rather from a standpoint that prioritizes participation and learning for all students, irrespective of their difference. Various aspects of MLS contributed to the demonstrated results since it offered authentic experiences and encouraged collaborative reflection on the impact of teaching and learning.

Hence, the organization of this session aims to provide the reader with a comprehensive understanding of the pivotal aspects revealed and discussed within this research. As a result, a synthesis will be meticulously crafted to navigate the integrity of the four studies presented, elucidating intersections and complementarities while also developing practical implications and insights to guide future investigations.

The following, separated by themes, will address generalizations and recommendations based on the contributions of this entire journey. Additionally, the limitations, implications, obstacles, and other challenges faced in education and beyond will be discussed, drawing from the knowledge built into this process. Finally, I share the perspectives I see for the future that lies ahead.

10.1 On initial teacher education

Based on the data produced and analyzed throughout this research process, it is urgent to consider broader possibilities for teacher education. This entails giving meaning to the

inherent processes of practical knowledge that student teachers already possess, providing support for them to comprehend, and promoting actions toward decentralizing knowledge control in a bottom-up approach. Additionally, it is crucial to provide student teachers with efficient preparation before they enter practical teaching experiences.

From the beginning of this journey, articles one and two informed us of the proclaimed benefits and constraints of implementing LS globally, including in the Brazilian setting. Initial studies demonstrated its applicability to various fields of knowledge and the recommendation of experts of a broader involvement of the community reaching the local, regional, and national levels. However, it is particularly worth noting that LS is mainly centered on investigations regarding mathematics. Although not intentionally on the part of the researchers, this data appears contradictory to me. The desired upscaling and spread of LS heavily depend on the collaborative efforts of educators and stakeholders to communicate the advantages of this methodology to their peers and demonstrate evidence of cooperation. This research calls for mathematicians who are LS experts to embrace LS's fundamental idea and try to include representatives from all areas of study. This means ensuring equal participation in broader discussions regarding this methodology in seminars, debates, and other similar opportunities such as conferences, workshops, and panel discussions.

After all, LS is conducive to transcending the realm of mathematics or any provided research lesson and addressing contemporary challenges surrounding constructing the desired 21st-century school. As Nóvoa (2022, p. 15) argues, “Education no longer fits into the school format of the late 19th century. [...] The school needs the courage to metamorphose, to transform its form”. Much has been said about the urgent need to equip future teachers with the practical and theoretical knowledge that will “metamorphose” the school we have today into a new school capable of meeting the demands of educating the 21st-century society. This effort depends to a large degree on the educational institutions responsible for preparing future teachers, public policies (including reviewing the teaching career), and student teachers themselves.

In this respect, a disturbing finding observed in this research is that half of the invited student teachers declined to participate in this research. This fact raises questions about how their preference for learning in a teacher-centered, top-down, ‘spoon-feeding’ teaching methodology will impact their professional proficiency. Oddly enough, while student teachers usually proclaim their intention of providing their future students with active learning and motivating them with hands-on activities, it is somewhat paradoxical that an expressive number

of pre-service teachers favored receiving uninspiring and passive learning experiences during their own training.

More than ever, there is a clear need to break away from disconnected initial training of teachers, in which the content of educational fundamentals is treated superficially compared to the processes occurring in the school context and beyond. Therefore, initial training, even when offered in based-school settings, should prioritize moving away from traditional teacher-led methods, which often focus on mechanically transmitting information, tending not to engage students effectively. It is as if it were simple and easy to address the concepts of active and interactive approaches to education and apply them to the initial teacher education life. Yet, it is not.

In this regard, caution should be taken not to risk offering a “lightened version of initial training,” as Lüdke and Boing (2012, p. 443) alert us. The authors explain that universities responsible for teacher training face criticism for focusing too much on academics and neglecting practical preparation. A trend is to rush initial training and shift work preparation to schools during in-service development. The question we are dealing with here is not that the training offered to future teachers does not represent complete preparation. The fact is that, as explained by Lüdke and Boing (2012), it does not even provide efficient initial preparation. In other words, their training is insufficient, even for getting started as a teacher.

To overcome these inefficiencies and, at the same time, withstand the high demands pre-service teachers and in-service teachers encounter, it is essential for them to, since the early stage of training, transcend isolation or, as described by a participant in the fourth article, the constant 'battlefield' that dominates teachers' performance within the school setting. Teachers must operate within a collaborative and supportive environment that fosters quality learning and reflection, which will, in turn, enable their students to recognize that they are situated in an environment conducive to the development of their potentialities and personalities. Since crises often lead to changes, it is high time that initial teacher education was given priority in the public policy agenda. It is not just a matter of filling up gaps here and there or rescuing a specific region of this continental country entirely of disparities and social inequalities.

Therefore, it is necessary for initial training to pave the way for the development of transdisciplinary knowledge, which deals with different levels of reality and complexity, in a movement in which formal disciplines become capable of, in a harmonious manner, offering new opportunities for meaningful learning. As reported in the fourth article, when Lamb (2015) proposed the ‘peer-learning model of Lesson Study,’ she was advancing to a more autonomous,

self-learning framework, consolidating the value of pre-service teacher learning through a meaningful and critically engaging environment.

The initial training of teachers establishes the foundation for their ability to teach effectively in schools and contributes to constructing their professional identity. Hence, practical initial training ensures that further professional development builds upon a solid foundation, avoiding the need to compensate for inadequate prior training, which incurs significant costs for teachers, governments, and schools. Improving initial training is critical for continuous education to achieve its goals (Gatti; Barreto; André, 2011).

However, it is imperative to acknowledge that neither universities nor schools individually hold the ability to address the essential requirements to prepare future teachers (Nóvoa, 1999). This highlights the need for new collaborative approaches to deconstruct traditional training models, create network curriculum models, and promote training focused on action and personal autonomy. This aligns with Schön's perspective, emphasizing that knowledge should enrich individuals' lives and practices, not just academic pursuits. The idea is to foster the growth of future reflective practitioners (Schön, 1984), capable of integrating theory into their teaching practice and reflecting on their experiences to contribute to theory-building with potential value (Labaree, 2004).

This argument gains significance as we understand and engage with the paradigm of inclusive education, which serves as a guiding principle for the development of essential changes in training approaches. Our proposal suggests that student teachers experience their learning through a constructionist, contextualized, and meaningful approach, allowing this experience to shape their professional identities and consecutively reflect their future teaching practices. Moreover, this research calls for the involvement of educational institutions, policymakers, and stakeholders in integrating various teacher training methodologies into the preparation of future teachers, thereby fostering a practical and immersive learning environment.

10.1.1 Recommendations on this theme:

1. Embrace Practical Knowledge: Institutions should recognize and leverage the practical knowledge possessed by student teachers, supporting them in decentralizing knowledge control through bottom-up approaches.

2. **Promote LS Across Disciplines:** Efforts should be made to broaden LS's application beyond mathematics, encouraging collaboration among educators from various fields and ensuring equal participation in discussions and events related to LS.
3. **Include Active Learning Methodologies:** Initial teacher education programs should prioritize moving away from adopting unique traditional, teacher-centered methods of instruction and focusing instead on active and interactive approaches to engage future educators in practical teaching experiences effectively.
4. **Foster Collaborative Environments and Reflective Practice:** Create collaborative and supportive environments for pre-service teachers, enabling them to integrate theory into practice and participate in theory-building with practical value. This will contribute to developing professional identity and prepare teachers for collaborative work in schools.
5. **Prioritize Initial Teacher Education:** Given its critical role in shaping the future of education, initial teacher education should be prioritized on the public policy agenda to address existing inefficiencies and prepare teachers effectively.

10.2 On inclusive education

Since enhancing inclusion improves learning outcomes for every student, efforts to promote inclusion should encompass all educators and the mainstream educational system. Such endeavors frequently require transforming the school ethos and shifting a teacher's perspective. Inclusion underscores the social dimension of learning by recognizing the student community as a valuable asset for educational advancement.

Global consensus is growing on the importance of integrating a diversity of practical and instructional teaching training methods with a more holistic view of students' needs, interests, and skills as a fundamental aspect of inclusive education. To establish an inclusive education system, ordinary schools must embrace inclusivity. In other words, they must improve their ability to educate all children within their communities. From this perspective, inclusion is considered to be "a process of addressing and responding to the diversity of needs of all children, youth and adults through increasing participation in learning, cultures, and communities, and reducing and eliminating exclusion within and from education" (UNESCO, 2017, p. 8–9). In this regard, as discussed in the second article of this thesis, the quality of inclusion services offered at schools is significantly influenced by the degree to which inclusive teaching methods are implemented within inclusive educational environments.

The emphasis on inclusive education reflects a broader understanding that the transformation of our schools in the 21st society relies on not restricting the role of the teacher around the “lesson.” Instead, it underscores their responsibility toward the entire educational work (Nóvoa, 2022). This implies preparing student teachers not only for individual success but also for addressing global challenges related to an interconnected world, making their development a priority for educational institutions, policymakers, and stakeholders across the globe.

From a comprehensive perspective encompassing all the articles comprising this thesis, data confirm the striking evidence concerning teachers' central role in providing inclusive, constructionist, contextualized, and meaningful instruction. As well put forward by Nóvoa (2022, p. 6), “nothing substitutes the work of a good teacher.” However, while acknowledging the fundamental importance of meeting the student’s needs in the contemporary world, this research provides recommendations and insights to improve teacher education. It recognizes that several questions merit further discussions, including i) Whose responsibility is it to include *the teachers*? ii) How can teachers feel included in the school setting and their own classrooms? iii) In what terms should teachers be respected and valued in their own learning and teaching processes? iv) Why is there a burgeoning incidence of teacher burnout leading to the abandonment of the teaching career? v) How can student training be more connected to the school context and the contemporary demands of 21st-century society?

Therefore, we argue that to foster inclusive and intercultural education, we must also focus on teachers and student teachers. True inclusion occurs when they are recognized, respected, and valued for their identities and realities while honoring their peers' dignity. Inclusion fundamentally involves acknowledging that all educators and students are unique individuals of equal significance.

Considering the needs of teachers and seeking ways to meet their demands go beyond (while including) the discussion of teacher training and the profession's value within society. From a social perspective, this appreciation also requires consistent career policies, fair salaries, and conducive conditions within the school environment, including infrastructure, teaching materials, pedagogical support, respect for their scope of action aiming at the establishment of democratic management within a cooperative context (Gatti *et al.*, 2019). From a global contemporary perspective, student teachers should be provided with opportunities of purpose that transcend the content subject itself and engage them with real-world issues by nurturing their critical thinking skills, teaching literacy, and enabling them to apply scientific knowledge in an open learning perspective (Okada *et al.*, 2024).

To shed light on this theme, the findings revealed throughout the four articles in this thesis confirm that the challenges facing teacher education for decades, without any practical or widespread solution, have hindered the universal improvement of education. To this end, this research introduces an innovative articulation between the CCM approach and the MLS methodology, significantly contributing to teacher training education from an inclusive perspective. It explored not only how to promote student inclusion but also how to foster inclusive learning among student teachers. We propose future research to examine pre-service teachers' pedagogical perspectives regarding the challenges and strategies, particularly about open schooling components to support their learning process.

Open schooling is a term coined by the European Commission to promote open education through cooperation with enterprises, universities, and communities to address real-life challenges (Okada *et al.*, 2024). In an open schooling learning environment, learners research and discuss real-world problems and experiences, connecting “what they learn at school with the world outside the classroom, to develop judgment, empathy, and care for the future” (Okada; Gray, 2023, p. 27). Although this concept is rooted in primary and secondary students to solve problems or tackle issues related to their real-life contexts (Okada; Sherborne, 2018), our suggestion is to innovate by using this concept in higher education to foster pre-service teachers' learning within the context of its implications to education. In an open schooling movement, student teachers could learn from real issues related to the quality of education and other global sustainable challenges to empower the community of teacher-learners and experts for change with competencies.

10.2.1 Recommendations on this theme:

1. **Implement Inclusive Education Practices:** Incorporate principles of inclusive education into teacher training, providing student teachers with constructionist, contextualized, and meaningful learning experiences that shape their professional identities and teaching practices.
2. **Promote Inclusive Teaching and Learning Environments:** Advocate for inclusive teaching methods and educational environments within the school system while fostering inclusive learning among student teachers through innovative approaches like the CCM approach and MLS methodology. This ensures all students are effectively educated and student teachers develop inclusive pedagogical perspectives.

3. Prepare Student Teachers for Global Challenges: Shift the focus of teacher preparation towards addressing global challenges in an interconnected world, prioritizing the development of student teachers as responsible educators capable of fostering inclusive and intercultural education.
4. Recognize and Value Teachers: Ensure that teachers and student teachers are recognized, respected, and valued for their unique identities and realities within the educational system, with consistent career policies, fair salaries, and conducive school conditions.
5. Provide Purposeful Opportunities for Student Teachers: Offer student teachers opportunities to engage with real-world issues, develop critical thinking skills, and apply scientific knowledge through purposeful learning experiences that transcend traditional subject boundaries.
6. Innovate with Open Schooling in Higher Education: Explore the concept of open schooling in higher education to foster pre-service teachers' learning within real-life challenges and implications for education, empowering them to become agents of change with relevant competencies.

10.3 On the CCM approach

During the implementation of this research, it was possible to notice how student teachers who were anxious, nervous, and unsure about their own ability to participate in the MLS cases became central figures in their learning journey. They worked individually and collectively to study, plan, teach, revise, and reflect on a class that was not aimed at fulfilling the subject teacher's or the researcher's expectations. Conversely, participants focused their learning on their interests, grounded in their contexts, making their learning and teaching active practices.

Rooted in the CCM approach, learning was centered around creating learning environments, activities, and a methodology that could actively involve student teachers in constructing meaning and knowledge. The CCM approach interlaced with the MLS underpinned the process to prioritize understanding and generating new knowledge, leading to a shift in the roles of both student teachers and the subject teacher.

The primary contribution of integrating the CCM approach with the MLS methodology was to redefine teaching practice, moving away from mere adaptation to a group of students. The CCM approach advocates for an educational system designed for all,

recognizing that learning varies in pace and style. This meant student teachers did not follow uniform learning paths, prompting them to reflect on their lesson plans and ensure inclusivity. The focus was on preparing student teachers to become inclusive educators, using the LS methodology practically supported by the CCM approach as its theoretical foundation.

When student teachers felt the proposed MLS aimed to develop their learning through practical, collaborative, and reflective practice, they felt confident and started to own their work. Making mistakes during the journey would not be a problem. Instead, reflecting on what went right was as valued and considered as what did not. What mattered was that mistakes would take participants to a greater knowledge level.

Thus, during the research process, it was necessary to understand how the knowledge inherent in the learning of teaching would be developed to prioritize the construction of meanings within a specific context (the context of each student teacher), using digital and educational resources (constructionist) for teaching planning aimed at the valuing difference. In this process, the learning spiral (Valente, 2005) served as a guide for observing and reflecting on the formation-action process. This involved continuously reviewing and reconsidering teaching plans and previous teaching concepts, verifying their conditions related to practice, and ensuring that they were meaningful for the effectiveness of planning and teaching in a contextualized reality.

As a result, the CCM approach supported participants to enhance their full potential of learning, collaborating, creating, and producing meaningful resources. Some participants found that their shyness would not refrain them from teaching. Some reported they found teaching challenging, while others found it possible to realize. Some concluded that they would not give up trying whenever facing a challenge. Some reported an enhanced sense of self-efficacy in teaching. Some acknowledged the importance of collaborative work. Some reported gains in content and pedagogical knowledge. Some became more aware of students' needs and how to become an inclusive teacher. The list does not end here.

Throughout the process, the subject teacher, the researcher, and knowledge others mediated the learning process, helping participants bridge the gap between theory and their practical experience, enabling them to relate meaning to their learning. Given the findings revealed in the research, we argue that using the CCM approach as a guideline to offer initial teacher education favored the growth and awareness of participants' teaching skills. Furthermore, the formalization, representation, execution, and debugging of the ideas in the learning training process allowed the student teachers to discover and correct errors, refining the entire knowledge construction process (Schlünzen, 2000). This aligns with Valente's (2005,

p. 55) concept of "contextualized constructionism," which introduces the active construction of knowledge in action, aiming for meaningful outcomes directly linked to the learners' reality and context.

From these assumptions, we return to the central idea discussed in this session and throughout this thesis: equipping future teachers to meet contemporary educational demands beyond just a 'lesson' and preparing these professionals to be autonomous, reflective practitioners. Beyond the reality inside the school domains, student teachers need opportunities to engage with the broader community in scientific discussions.

Given its conceptual depth and pedagogical potential, the CCM approach has served as a solid knowledge base for refining and deepening the understanding of how to support teacher education in a meaningful, contextualized, engaging, and relevant manner. Here, we propose that future studies explore how the CCM approach and the LS methodology can be helpful in training pre-service teachers in open learning perspectives, enabling them to reflect on and solve real-life issues related to the quality of education and other relevant, sustainable challenges.

As discussed in a previous researcher's publication (Fluminhan; Okada; Schlünzen Junior, 2023, p. 23), open schooling "emphasizes education as a socially transformative and inclusive process that highly regards diversity and meaningful learning." This underscores its compatibility and potential for collaborative use with CCM and LS in teacher training projects.

10.3.1 Recommendations on this theme:

1. **Implement the CCM Approach in Teacher Education:** Incorporate the CCM approach into teacher education programs to create learning environments that actively involve student teachers in constructing meaning and knowledge. This involves designing an educational system that welcomes diverse learning styles and paces, encouraging student teachers to reflect, and ensuring inclusivity. Emphasize practical, collaborative, and reflective practices that prioritize understanding and generate new knowledge, thereby shifting the roles of student and subject teachers.
2. **Foster Confidence and Ownership in Student Teachers:** Ensure that student teachers feel confident and take ownership of their learning journey by framing learning experiences as opportunities for growth, collaboration, and reflection. Emphasize the value of mistakes as learning opportunities and prioritize constructing meaningful teaching plans tailored to individual contexts.

3. Explore Collaborative Learning Perspectives: Explore how the CCM approach, combined with LS, can support student teachers in engaging in scientific discussions and addressing real-life issues related to education quality and sustainability through collaborative projects rooted in open schooling principles.

10.4 On the MLS methodology

MLS is not considered a weakness or a methodological limitation in this research. Instead, MLS is seen as a robust process that can and should be used in initial teacher education alongside other teaching methodologies to prepare student teachers with greater capacity to reflect and face the demands they will encounter. As our study progressed and the literature demonstrated several positive outcomes associated with using MLS in teacher education, we concluded that this methodology could be critical for our intended research. Finally, as documented extensively, we argued, particularly in the last article, that the MLS methodology enabled participants to experience authentic learning, albeit in a simulated setting. MLS stimulated participants' learning interests, fostered personal transformation, and pushed them to think, analyze, act, and reflect as teachers, sharing common aspects with the CCM approach.

In this research, the concept of authentic learning was questioned by the idea that an environment or an activity perceived as authentic in the eyes of educators will be automatically assumed as authentic in the eyes of students, or vice-versa. Drawing upon the ontological view of authentic learning in adult learning literature, (Lee, 2020, p. 572) posits that this concept “focuses on ‘enabling’ or ‘empowering’ each adult to be an authentic self in their learning contexts, and to become a more authentic person in their real-life contexts as an outcome of their learning.” Therefore, what we understand by authentic learning is more related to experiencing a certain degree of change in one's self-perceptions than merely the physical space or who the individuals involved are. In practical terms, in this study, authentic learning occurred when participants constructed new knowledge, and their perceptions of themselves were transformed. We can say that learning was genuinely authentic and authentically meaningful.

A disturbing question that permeates this stance is: why is the performance of future professionals in a simulated setting so questionable and reluctant and receives such a great deal of criticism in the educational field of *teacher training*? Why does preparing pre-service teachers in a controlled and safe environment need to be justified, defended, explained, and proved throughout the process, even before experienced educational researchers and educators?

The provision of simulated practices does not seem to be rejected in other fields. After all, who would undergo surgery with a doctor on their first day of work knowing they have never practiced with corpses, artificial intelligence, or medical mannequins during their training? Would it be reasonable for a pilot to fly a real aircraft on their first day of work without using simulators and practicing in an ‘artificial’ environment first? In Law schools, students are expected to participate in simulated courtrooms in a fictitious setting within the university walls where the defendant is a peer student; the prosecutor is a peer, the lawyers, the district attorneys, the jury, the audience are peers, and, guess what, the judge is not a judge, but another peer. A hairdresser, a tailor, a dentist, a flight attendant, a firefighter, an architect, an astronaut, or any other professional should undergo initial training through controlled and simulated conditions. Investments in simulating reality in training programs are significant and becoming increasingly sophisticated. This is not only expected but also welcomed and applauded.

Regardless of the educational field, virtual and augmented reality have demonstrated extraordinary potential to support teaching and learning, creating an effective academic environment. In a recent scoping review, Kibat, Ngelambong, and Scott (2023) found that augmented reality enhances student learning by increasing motivation and interests more effectively than traditional classroom methods. However, they acknowledged that technical issues and educator resistance are significant challenges. In this context, Zhang et al. (2024) propose using virtual reality microteaching training to provide pre-service teachers with a complex and lifelike environment to develop their teaching skills, particularly enhancing their efficacy in instructional strategies and classroom management.

Perifanou, Economides, and Nikou (2023) investigated the perceptions of 93 educators on integrating augmented reality in education. The findings showed that augmented reality could facilitate interactive, experiential, authentic, situated, anytime-anywhere, problem-solving, collaborative, innovative, and alternative teaching methods. The authors recommend that teachers be offered training and professional development on integrating augmented reality into their teaching practice.

Even though such cutting-edge technologies were not available in the conduction of this research, from the student teachers’ perspective, they experimented with an activity within an authentic context. But what is a ‘real context’? We must view this experimental research through the eyes of those it was intended for. If the reader is an experienced teacher with years, maybe decades of teaching, this might be considered an artificial or incomplete proposal. However, for those experiencing their first moments of standing before people to conduct a planned lesson, MLS was perceived as an authentic active task in a natural context. Whose

context? The student teachers'. Their real context, at this point, while in their third semester in the program, is within the university walls.

In line with this understanding, Lee (2020, p. 570) considers that "the increasing diversity among today's online students in terms of their needs, backgrounds, and learning and living conditions, even defining 'what is real and to whom' is a difficult task." Not surprisingly, at the beginning of this study, participants reported feelings of anxiety, fear, confusion, low self-efficacy beliefs, and, in some cases, justified what did not come out as expected due to their lack of experience as teachers. They described what they witnessed during the research lesson as a lesson being taught to students. They also compared situations that might occur if they were teaching in pre or elementary school settings. This is ideally expected and even intentionally provoked on certain occasions. After all, we all knew well that this was a controlled, planned, organized activity in a simulated environment. What matters, however, is that MLS enabled student teachers to transcend the academic field, coming out of their comfort zones and developing a will and predisposition to learn, delve into research, be open to new approaches, and, more importantly, believe they can do it all and become the teachers they aspire to be.

My intention is not to suggest that teacher education programs should pretend to be immersed in a site they are not. Instead, I advocate for a setting where student teachers can envision their initial teaching experiences in an intentional, safe, and down-to-earth environment that will support and encourage them to reflect, confront their own limitations, and open up different possibilities. MLS supported student teachers in experiencing emotional and cognitive learning and finding ways to overcome the barriers in their own learning processes. As a result, the findings revealed that participants could learn new knowledge and become more authentic and better prospective teachers.

Thus, I am arguing for a place where teacher educators are ready to walk with student teachers through their transformative learning journey, supporting them in anticipating the first cycle of a teacher's life (Nóvoa, 2014) and not being frustrated when they come across some situations they could have been prepared for in their initial teacher education. If student teachers are not assisted in further developing their pedagogical repertoire, chances are that sentiments of stress, burnout, and attrition that could have been avoided may become prevalent.

The reader might think they will face frustrations anyway. They will go through situations a university's initial teacher program cannot prepare them for. Agreed. However, we are in the position of providing them with as many opportunities as possible to prepare future teachers to embrace this profession with enthusiasm and realistic views. I make an analogy with

Nóvoa's (2022) thoughts to argue that it is our responsibility to protect student teachers, transform student teachers, and value student teachers so that when they become teachers, they will have the appropriate and sufficient means to protect the school, transform the school and value the school.

10.4.1 Recommendations on this theme:

1. **Integrate MLS in Initial Teacher Education:** Incorporate the MLS methodology into initial teacher education programs to enhance student teachers' capacity for reflection and face the demands of their future careers. Emphasize MLS as a robust process that fosters authentic learning experiences and personal transformation, complementing other teaching methodologies.
2. **Include Simulated Practices in Teacher Training:** Acknowledge the value of simulated practices, such as MLS, in teacher training as essential for preparing student teachers to confront real-life teaching challenges. Emphasize the importance of providing intentional, safe, and supportive environments where student teachers can address their limitations, reflect, and develop their pedagogical repertoire.
3. **Support Teacher Educator Role:** Advocate for teacher educators to support student teachers through their transformative learning journeys, preparing them for the challenges and realities of their future careers. Emphasize the importance of protecting, transforming, and valuing student teachers to ensure they enter the teaching profession with enthusiasm and realistic perspectives.

10.5 On the future with a future

This thesis demonstrates the trajectory of understanding how the interconnectedness of MLS and the CCM approach can support student teachers in their initial teacher education and help them frame their identity as inclusive future teachers. However, at this point, while acknowledging and cherishing the gains obtained, I must admit with a bit of sorrow that it could have been more.

During these years of investigation, this study was conducted from the perspective of LS as an iterative cycle that can and should be sustained throughout a teaching career in lifelong education and broad life education (see Nóvoa, 2022). This assumption is captured from the national and international specialized literature. However, although the CCM approach views

learning as a spiral process, there was little emphasis on expanding learning by reflecting and confronting original ideas to build new knowledge.

The data produced in this research led the researcher to the next stage of investigation: to explore a more comprehensive notion of LS and MLS articulated with the CCM approach as a methodology capable of enhancing learning as a result of a spiral process, provided not only as a continuous process but as a process in growing circularity within the network of learners. Just like students, teachers are unique in their pace and interest in learning. Investigating LS and MLS from the concept of spiral learning could reveal how teachers and student teachers develop different levels of depth and types of reflections to produce new knowledge. Further study is needed to investigate the spiral character of teacher learning and how the mechanism of LS and MLS can be applied to support the process of knowledge-building.

The research described here has allowed me to grow as an educator and researcher. I closely studied, interacted with, reflected on, and documented the participants' reactions to the MLS development. One striking concern, however, arises at this moment. Zeichner (2007) explains that while researchers conducting self-study gain personal benefits from the experience and the results obtained often inform and improve teacher education, they frequently fail to influence the broader research community and policymakers. Contrary to this perspective, another task comes into focus: the struggle to disseminate results, participation in in-depth discussions on the theme, and the effort towards consolidating or reformulating what has been learned.

Several limitations must be acknowledged as I reflect on the decisions, conditions, and opportunities surrounding this research. Unfortunately, it was not feasible to conduct individual interviews with participants to understand their concepts of teaching, student learning, inclusivity, and their own learning process before, during, and after the implementation of this research. Conducting in-depth interviews could have potentially revealed aspects not captured in this investigation and allowed for a more robust understanding of how the spiral of learning occurred.

I also recognize that not including the 33 student teachers who declined our invitation to participate in the research is a limitation. This omission potentially hindered critical data collection, which could have shed light on whether the interconnectedness of the approaches applied to student teachers with a preference for teacher-led instruction could have resulted in different outcomes by the end of this research.

Another aspect that posed difficulties for our proposal, as commonly reported in the literature, was the restricted time available for conducting all the steps proposed for this study.

Firstly, this discipline was held in the second semester of 2022, starting in October and ending in February 2023. During this period, two significant events interfered with our schedule: the World Soccer Cup and the holiday season. Secondly, it would have been more fruitful had we had the opportunity to develop the MLS over the course of one academic year.

It is possible that our MLS has raised more questions than it has answered. As I near the end of this thesis, it becomes clear that viewing LS or MLS as mere cycles is insufficient. They have to be set in a spiral perspective of learning. Additionally, as the study unfolded, it became evident that student teacher learning could have been more profound and aligned with the international objectives of the Agenda 2030 if it had been intertwined with the perspective of open schooling, incorporating real-life problem-solving to empower student teachers and specialists for competency changes. Therefore, I am ready to start. I mean, to proceed.

This journey has allowed me to live in a CCM environment and helped me understand that the science we produce reflects our way of seeing the world and our way of being and existing in it; it embodies our values and beliefs. It is a way of life. Therefore, it becomes clear that our investigation efforts are not centered on the teacher, the teaching, the learning, or the student. While all these elements are relevant, they will either pass or be transformed. We research what is meaningful to life.

Considering the idea of a spiral that does not close, there is still much to clarify about the contributions of LS and MLS and how to support teachers and student teachers in developing an inclusivity identity – I am far from achieving the desired results! Thus, I am situated in this thesis as a true spiral in the process of learning, which has a starting point and no end. I borrow Valente's (2005, p. 142) words to say, "The spiral keeps on spinning!"

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APPENDIX A



Unpacking CCM and Lesson Study

Reflections from "Articulating the CCM approach and Lesson Study: A promising teacher professional development towards inclusive education"

WALS 2023, Zwolle-NT

Paula Castro, Carmem Lima, Elisa Schlünzen & Klaus Schlünzen

Agenda

- Reflections from "ARTICULATING THE CCM APPROACH AND LESSON STUDY: a promising teacher professional development towards inclusive education"
- Objectives/Methods
- Context/General background about initial teacher education in Brazil
- Theoretical Framework
 - CCM approach
 - Research Lesson Study
 - Inclusive education: equality & equity for all
 - Findings
- Conclusion
 - Theoretical Framework application: fieldwork at the BA in Education course at State University of São Paulo



Single Talk

This presentation shares the reflections and analysis of the article: ARTICULATING THE CCM APPROACH AND LESSON STUDY: a promising teacher professional development towards inclusive education

<https://vjshr.uabpt.uema.br/index.php/ojs/article/view/8>

Article Objectives

Investigate the Constructionist, Contextualized, and Meaningful (CCM) approach as a possible fit to create enhanced conditions for inclusive education in tandem with Lesson Study.

Method used

International narrative research literature



Context: initial teacher education in Brazil

1. **Low Quality Education Undergraduate Courses:** National reports indicate that, from 2011 and 2021, there were relevant shortcomings in practical preparation, alignment with classroom needs, and incorporation of innovative methodologies. (Inep, 2022)
2. **Low Quality Distance Learning:** In addition, they estimate that 60 per cent of pedagogy graduates in the country have done distance learning - highly criticised for using standardised and outdated material, in which students lack of contact with teachers, and centres hold poor infrastructure.
3. **Challenges in the the courses' structure:** Gaps in exposure to real classrooms in schools, supervision of internships, and integration of educational technologies.
4. **Traditional Methodologies:** Courses still emphasises knowledge transmission with limited focus on innovative practices. Lack of active and reflexive learning and methodologies.
5. **Undervaluation of the teaching profession:** Brazilian society, media and policymakers undervalue teachers, which is reflected in low salaries, poor working conditions, and job dissatisfaction. A 2022 report from SEMESP (Union of Higher Education Institutions) shows that by 2040 Brazil will have a shortage of 235,000 basic education teachers.

Theoretical framework of the article

- The Constructionist, Contextualized, and Meaningful (CCM) approach (Schlünzen et al., 2020)
- Research Lesson Study (Dudley, 2013)
- Inclusive Education (European Agency for Special Needs and Inclusive Education, 2014)



CCM approach

Schlünzen et al., 2020

Consists of the creation of a learning environment that is at the same time **constructionist, contextualised and meaningful for the learners in an inclusive perspective - learning for all.**

Constructionist environment

Students use resources to create tangible **artifacts**, constructing knowledge based on their **interests**. They actively engage with the learning materials experiencing **deeper** levels of **learning**.

Contextualised learning

Learning stems from the learners' **contexts**, it develops from the learners' **curiosity** and **experiences** related to their realities and **background**. This makes learning personal and relevant.

Meaningful learning

As students learn, cognitive challenges arise. **Teachers mediate** the learning process by providing proper support to the construction of new, **formal** and **meaningful knowledge**. Each learner contributes to the knowledge building process based on their **skills and interests**.

Theories behind the CCM approach

Piaget (1970) - Cognitive Theory. Knowledge organisation, mental structures - schemas - that organise and interpret information, assimilation and accommodation, constructivism emphasizing the active role of learners in constructing their own understanding through interaction with the environment.

Vygotsky (1934, 1978) Socio-cultural Theory. The role of social and cultural factors in cognitive development. Importance of language, culture, and social interaction in thinking and learning processes; scaffolding; ZPD, real and proximal development; social interaction, learning as a social activity.



Theories behind the CCM approach

Papert (1980) Constructionist Theory. Spiral Learning. Actively engaging in constructing something meaningful allows for learning; experiential learning. Spiral development, learning as an iterative process, where individuals revisit and deepen their understanding of concepts over time.

Freire (1970) Critical Theory. Emphasises that learning should lead to action in the real world, it advocates for the transformative power of informed action. Learning should actively involve learners in critically understanding and transforming their social reality.



Connection amongst the 4 theories

1. All individuals can learn (inclusion).
2. All individuals are capable of learning at their pace in spiral learning.
3. All learning is influenced by the socio-cultural context individuals are immersed in.
4. Teaching is not transmitting and learning is not reproducing. The emphasis is on the active teaching and learning practices and the rejection of the banking education model.

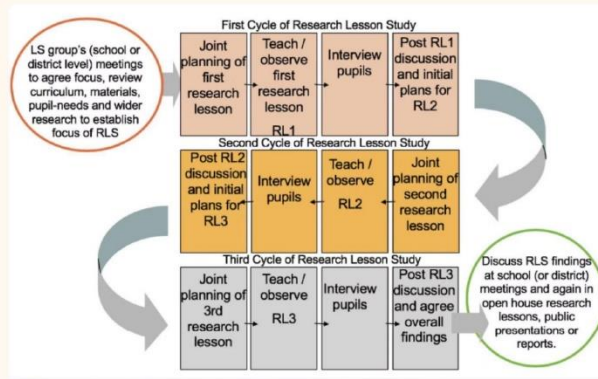
Research Lesson Study

Dudley, 2013

Consists of a methodology for improving teaching and learning, and informing curriculum design and implementation. It is a bottom-up approach to education innovation, originally from Japan, that is now spread over 80 countries around the world.

- is a highly specialised form of collaborative classroom **action research** by a **group of teachers**. puts
- **practice under review**.
- **requires that teachers** search-out and consider alternatives or innovations.
- involves **conducting studies** of student learning, **adjusting and honing new approaches**. forms
- tight-knit teacher learning communities.

Research Lesson Study Cycle



Adapted from Dudley, 2019

Research Lesson Study

Diverse

RLS has been introduced to various countries and cultures, and has been used across different subject matters in various contexts.

Instructional

RLS is a powerful mechanism for teacher learning. Holds the potential to bring about real instructional change in the classroom (Dudley, 2019). It also unearths PCK that, in tacit form, is invisible to our conscious thought.

Equitable

RLS creates safe spaces where teachers can take risks together and fearlessly work on areas of the curriculum in which they feel less confident or secure. There is no hierarchy amongst teachers in the LS groups, both experienced and novice teachers are open to learning.



Inclusive education: equality and equity

European Agency, 2014

- Inclusive education Vs. Special needs education
- How to embrace diversity in schools, classrooms, and the curriculum
- How to make progress at National level
- How to implement proper policy measures at regional and local levels
- **How to develop teachers' expertise, skills, and confidence in implementing inclusive teaching approaches**

Practice: fieldwork in the Brazilian higher-education context

Setting: Undergraduate Pedagogy Program (São Paulo State University, Unesp, Brazil)

Period: One academic term, from October 2022 to February 2023

Participants: One Researcher, One Supervising Professor, 66 student-teachers were invited, 33 declined opting for traditional pedagogy over the course, 33 students accepted to join-in (divided into 9 LS groups), and three knowledgeable others

Method: Microteaching Lesson Study (Fernandez, 2005; Cajkler et al., 2013), including knowledgeable others (Takahashi & McDougal, 2016)

Practice: fieldwork in the Brazilian higher-education context

Analysis (in progress)

Quotes: "I consider it fundamental to apply the practice in the context of initial teacher training, even if in a simulated way (microteaching), since in some cases it is difficult for student teachers who have never experienced school and classroom daily life to relate "what is written" with "what to do in the classroom" - theory and practice."

"I really enjoyed the experience because I felt that I was free to make mistakes and make amends for my mistakes, as well as working as a team in a light way, being able to apply what I learned in my profession."

"In general, I didn't like the proposal, I think it adds very little and doesn't fit the reality of classrooms in Brazilian public early childhood education schools, where there aren't even projectors, computers and speakers available."

Noticings: While the experiment (CCM+LS) was proposed for a cohort of 66 teacher-students pursuing their B.A. in Education at a prestigious university in Brazil, it is noteworthy that half of the group chose to opt-out and adhered to the conventional methodology involving readings, discussions, and written exams.

Wonderings:

- Why do many student-teachers choose not to use active learning methods in their study programme, despite the constant orientation toward more progressive methodologies?
- Why do student-teachers resist experiencing first-hand innovative methodologies?
- What are the chances that this attitude will be mirrored in their lessons when they are qualified to teach?
- What measures can be taken to encourage a shift in the mindset or standpoint of student-teachers towards a more open and receptive approach to innovative methodologies?

For future consideration:

- Address the need for a better understanding of teachers' attitudes and beliefs about resisting the use of innovative methodologies for their own learning.
- Investigate if these attitudes and beliefs as student-teachers will impact on their future teaching practices.

Thanks for your generous attention!



Carmem Lima
carmem.fluminhan@unesp.br



Paula Castro
pt411@cam.ac.uk



Klaus Schlünzen Jr.
klaus.junior@unesp.br



Elisa Schlünzen
elisa.tomoe@nesp.br