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Unveiling metacognitive awareness in the teacher training: A systematic review of the challenges in planning and carrying out teaching practicum

Desvelando la conciencia metacognitiva en la formación docente: una revisión sistemática de los desafíos en la planificación y ejecución de las prácticas docentes

Dalia Patricia Madera Doval
daliamadera.est@umecit.edu.pa
https://orcid.org/0000-0003-3451-9110
Universidad UMECIT
Montería – Colombia

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Abstract

This systematic review examines the main challenges faced by pre-service teachers during the planning and implementation phases of their teaching practicum. Using the PRISMA protocol and a mixed-methods design, 133 peer-reviewed articles published between 2014 and 2024 across 33 countries were analyzed. The review identifies five key domains of difficulty: classroom management and instructional planning, technological infrastructure and digital preparedness, institutional and mentor support, critical and reflective thinking, and diversity and inclusion in classroom environments. The analysis shows that insufficient resources, limited support from mentors, inadequate training in digital pedagogy, and sociocultural constraints reduce pre-service teachers' confidence and effectiveness in applying instructional plans. The transition to online teaching during the COVID-19 pandemic further revealed systemic limitations in digital infrastructure and pedagogical preparation. The findings suggest the need for coordinated improvements in teacher education programs, including access to stable technological tools, integration of practical digital pedagogy, and structured mentoring that combines instructional guidance with socio-emotional support. This review contributes to the understanding of barriers in pre-service teacher preparation and offers evidence-based directions for improving teaching practice across educational contexts.

Keywords: student teachers, teacher training, teaching practices, lesson planning, instructional challenges

Resumen

Esta revisión sistemática examina los principales desafíos que enfrentan los futuros docentes durante las fases de planificación e implementación de sus prácticas docentes. Utilizando el protocolo PRISMA y un diseño de métodos mixtos, se analizaron 133 artículos revisados por pares publicados entre 2014 y 2024 en 33 países. La revisión identifica cinco áreas clave de dificultad: gestión del aula y planificación instruccional, infraestructura tecnológica y preparación digital, apoyo institucional y de mentores, pensamiento crítico y reflexivo, y diversidad e inclusión en los entornos de aula. El análisis muestra que la insuficiencia de recursos, el apoyo limitado de los mentores, la capacitación inadecuada en pedagogía digital y las limitaciones socioculturales reducen la confianza y la

efectividad de los futuros docentes en la aplicación de los planes de instrucción. La transición a la enseñanza en línea durante la pandemia de COVID-19 reveló además limitaciones sistémicas en la infraestructura digital y la preparación pedagógica. Los hallazgos sugieren la necesidad de mejoras coordinadas en los programas de formación docente, incluyendo el acceso a herramientas tecnológicas estables, la integración de la pedagogía digital práctica y la mentoría estructurada que combina la orientación instruccional con el apoyo socioemocional. Esta revisión contribuye a la comprensión de las barreras en la preparación docente previa al servicio y ofrece instrucciones basadas en evidencia para mejorar la práctica docente en todos los contextos educativos.

Palabras clave: docentes en prácticas, formación docente, prácticas docentes, planificación de clases, desafíos de la instrucción

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INTRODUCTION

The training of future educators through teaching practicums is an important stage in their process to becoming competent teachers (Bahodirovich & Romilovich, 2021; Nocetti & Medina, 2018). The teaching practicums are structured, supervised, and hands-on experiences integral to teacher education programs, providing preservice teachers with opportunities to apply theoretical knowledge in authentic classroom settings (Griffiths et al., 2021). These practicums involve observation, assistance, co-teaching, and eventually independent teaching under the guidance of experienced mentor teachers (Scott et al., 2014).

Although the teaching practicum constitutes a central component of teacher education, planning and implementation challenges continue to undermine the overall effectiveness of pre-service teacher preparation. This review applies a rigorous systematic methodology, synthesizing empirical evidence drawn from 33 national contexts to capture the full range of practicum experiences and associated obstacles. Teacher education practices vary significantly across different educational contexts, with inherent variations in systems and training programs. This review seeks to provide a comprehensive perspective on these diverse practices, aiming to identify patterns, common challenges, and innovative approaches that can enrich discussions on best practices in teacher preparation. Previous systematic reviews have explored challenges in the planning and implementation of teaching practicums, often focusing on specific aspects in isolation (Ortube et al., 2021, Silva et al., 2021; Kakazu & Kobayashi, 2023). This study is distinctive in its focus on both the planning and execution phases, addressing the challenges pre-service teachers face from preparation to classroom implementation. The review offers a comprehensive understanding of these challenges and provides recommendations that are contextually sensitive and relevant across a range of educational settings.

This systematic review documents the limitations and obstacles preservice teachers encounter during both the planning and execution phases of teaching practicums. This emphasis on both planning and execution of the practicum sets this systematic review apart from existing literature. The distinctive factor lies in the comprehensive examination of challenges encompassing the entire spectrum of teaching practicum, ranging from the preparatory phase—where preservice teachers engage in class planning—to the implementation and development of these planned classes. The term "planning" refers to the preparation involved in structuring the teaching experience. This could include creating lesson plans, designing activities, organizing materials, and outlining the overall strategy for teaching during the practicum (Hutchison & Colwell, 2016; Sawyer & Myers, 2018; Dubek & Doyle-Jones, 2021; Krepf & König, 2022; Cheng, 2025). While "carrying out" the practicum encompasses the implementation phase. This involves teaching lessons, interacting with students, utilizing the planned materials and methods, adapting to the classroom environment, and adjusting based on the real-time response and feedback received (Pugach & Peck, 2016; Rusznyak & Walton, 2017; Maiorca & Mohr-Schroeder, 2020; Kruse et al., 2022; McNeilly et al., 2022).

This review aims to provide a more holistic perspective on the challenges and barriers that pre-service teachers face, examining both the conceptualization of lessons and the translation of lesson plans into effective classroom practices. This emphasis on the intertwined challenges of planning and executing teaching practicums is a unique feature of this systematic review, distinguishing it from previous studies that might have explored either planning or implementation challenges in isolation.

Through synthesizing the findings of multiple research papers, this research aims to provide a comprehensive overview of the challenges impacting teacher training programs. Additionally, this review will identify common themes and patterns among the challenges, enabling a deeper understanding of the underlying factors contributing to these barriers. The findings of this research will offer knowledge to educational policymakers, teacher training institutions, and educators, facilitating the development of strategies and interventions to address the identified challenges.

The following research question guided this study:

Q1: What challenges do pre-service teachers encounter in planning and carrying out teaching practicum?

The rest of the paper is organized as follows: Section 2 presents the scoping review as the method used, the search strategy and data extraction. Section 4 presents the review's outcome, organizes the literature findings according to the main themes that emerged after the inductive analysis of the response of each paper to the research question. In conclusion, we derive the theoretical and practical implications of the study, along with imitations and future research.

METHODOLOGY

This systematic review follows the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) approach (Page et al., 2022) to evaluate and synthesize existing literature concerning the challenges that pre-service teachers face during their teaching practicum. The PRISMA method involves a rigorous process of identifying, screening, and selecting relevant studies based on specific inclusion and exclusion criteria.

The review adopts a mixed-methods approach for conducting systematic literature reviews (Torgerson & Porthouse, 2005; Risko et al., 2008), integrating both quantitative and qualitative research strategies to explore the challenges pre-service teachers face during their teaching practicum (Evagorou & Puig, 2016). This combined methodology increases the review's rigor, facilitating the identification of statistical patterns and trends in quantitative data and capturing the detailed evidence produced through qualitative analysis.

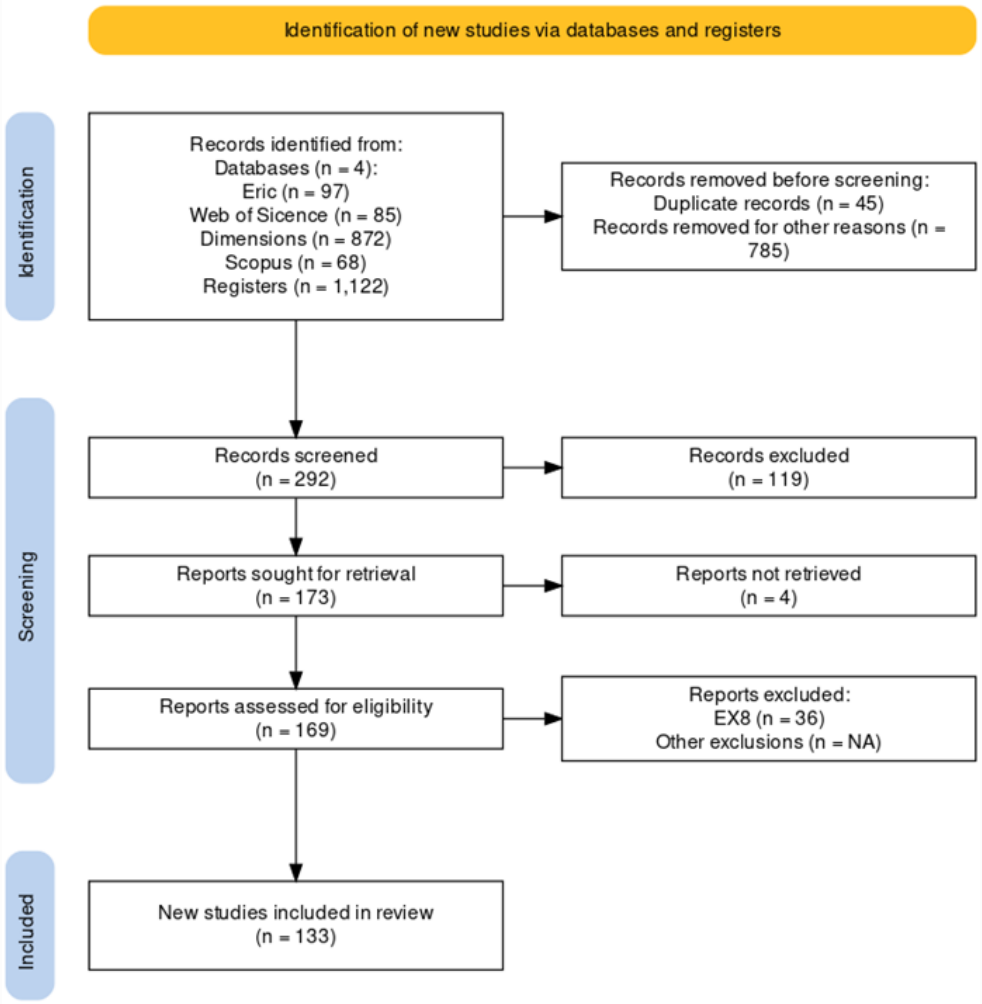
Quantitative data were drawn from studies that report numerical findings, such as the frequency or prevalence of challenges. This data helps synthesize the extent to which specific issues are widespread across different educational contexts. Gough, Oliver, and Thomas (2017) support this approach and argue that including quantitative findings in systematic reviews is essential for achieving a comprehensive understanding of the issue's scope.

Qualitative data, in contrast, originate in studies examining the experiences, perceptions, and contextual factors that shape the challenges pre-service teachers face Gall et al. (1984). This aligns with the recommendations of Liberati et al. (2009), who stress the value of incorporating qualitative research in systematic reviews to capture the complexity of human experiences that are often not measurable through quantitative methods alone.

The combination of these methods provides a more holistic understanding of the challenges pre-service teachers face and produces conclusions that are both contextually rich and broadly applicable. The qualitative data were analyzed separately and are presented in the Results section, where the themes and responses from the studies to the research question are discussed in greater depth (Glaser & Strauss, 2017). In this research, articles examining the planning and execution of teaching practicums for pre-service teachers were identified through a systematic search of databases covering the last ten years. The search adhered to the PRISMA statement protocol (Page et al., 2022). The criteria for selection and the inclusion process are described below in the PRISMA diagram shown in Fig. 1.

Figure 1

PRISMA flow chart. Own elaboration

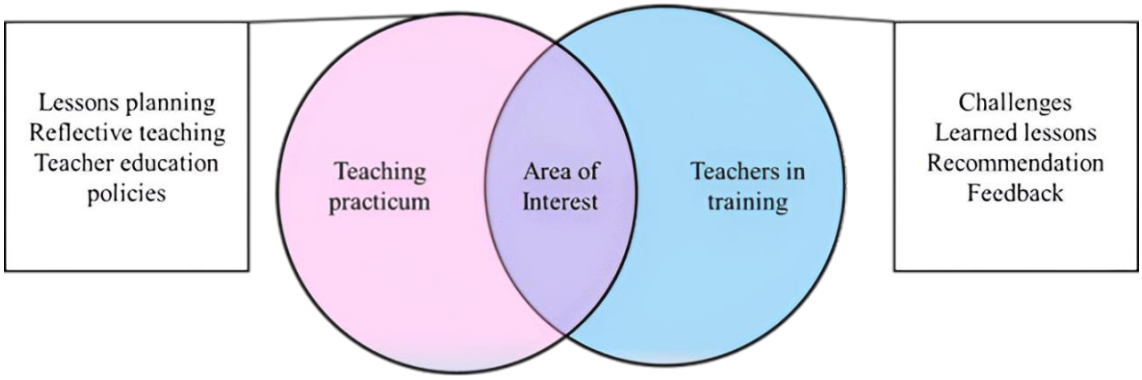


Identifying search criteria

The following databases Scopus, Dimensions, Web of Science and Eric were consulted. The review of bibliographic information related to teaching practicum focused on four search terms: pre-service teachers, teaching practicum, lesson planning and challenges (see Fig. 2). The four original terms were then expanded using synonyms from the databases.

Figure 2

Diagram of search term clusters



Note: own elaboration.

A specialized search equation was designed in Spanish and English, considering keywords and synonyms.

Q1: TITLE-ABS-KEY (challenges AND (“pre-service teachers”) AND (“lessons planning") AND ("teaching practicum"))

The systematic review process was carried out between January 2023 and July 2023.The selection of the articles to be reviewed was carried out in three rounds. The first round of analysis was in the identification phase where the investigations from these databases that met the following criteria were selected, Q1: (IC1) period from 2012 onwards; (IC2) the article was written in English or Spanish with an available full-text version, (IC3) peer-reviewed academic journal articles, (IC4) the full text of the article is available, (IC5) The article does not appear in another database. In this first round, the search yielded a total of 1077 articles in the identification phase once the criteria were applied.

Screening

In the second round, the authors independently analyzed the articles. The selection criteria were established according to the research question, and the results were organized in a table. The selection criteria applied are the following: (IC6) the participants in the study were pre-service teachers; (IC7) the challenges in planning and carrying out the teaching practicum must be relevant to the central theme of the article; In total, 292 articles were retrieved from the initial search. After having applied the IC6 selection criteria where 785 articles were excluded, then the IC7 selection criterion was applied where 119 articles were excluded, leaving 173 articles selected in the second round.

The third round consisted of applying the selection criteria (IC8) the article describes research related to: challenges in teaching practicum / systematization strategies of teaching practicum / recommendations in teaching practicum. Which led to an exhaustive reading of the articles. In this round, 40 articles were excluded, 36 of them because they did not meet the inclusion criteria and 4 could not be retrieved, leaving 133 articles selected for the study.

Data extraction

Through a rigorous scientific approach, we treated the empirical evidence from the selected studies as raw data, subjecting it to comprehensive analysis in three distinct stages. Initially, our focus rested on identifying the challenges encountered by pre-service teachers during their pedagogical practice, as reported in each of the studies. This meticulous examination led to the discernment of a diverse array of challenges, problems, and complex situational contexts.

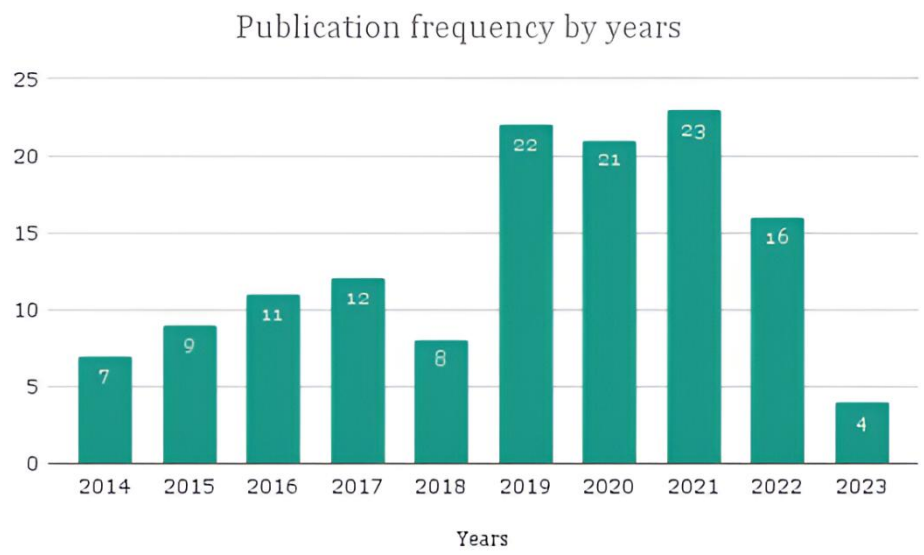
Subsequently, employing an inductive analysis method, we set out to categorize these difficulties pre-service teachers encountered during their teaching practicum. The inductive method suggested by (Lincoln & Guba, 1985) was used to carry out a systematic review and analysis of the collected data. The inductive analysis process consisted of delving into the context of the study and using qualitative data collection methods, such as the analysis of relevant documents. The data that was gathered underwent a thorough examination to uncover patterns in the shape of codes. These codes were subsequently organized into comparable categories, leading to the identification of emerging themes and meaningful connections. This process followed an iterative approach aimed at comprehending the analyzed phenomena. To increase the validity of the study, the authors independently coded the findings to confirm them. This inductive method allowed a deep and contextualized understanding of the challenges of pre-service teachers when planning and carrying out teaching practices.

Characteristics of included studies

Analysis of the 133 retained studies revealed that studies of pre-service teacher challenges in planning and conducting teaching practices began to appear in 2014. The year with the most studies that entered our search is 2021, as shown in graphic 1. Our results show a relevant increase in the number of studies published in the last ten years.

Graphic 1

Diagram of search term clusters



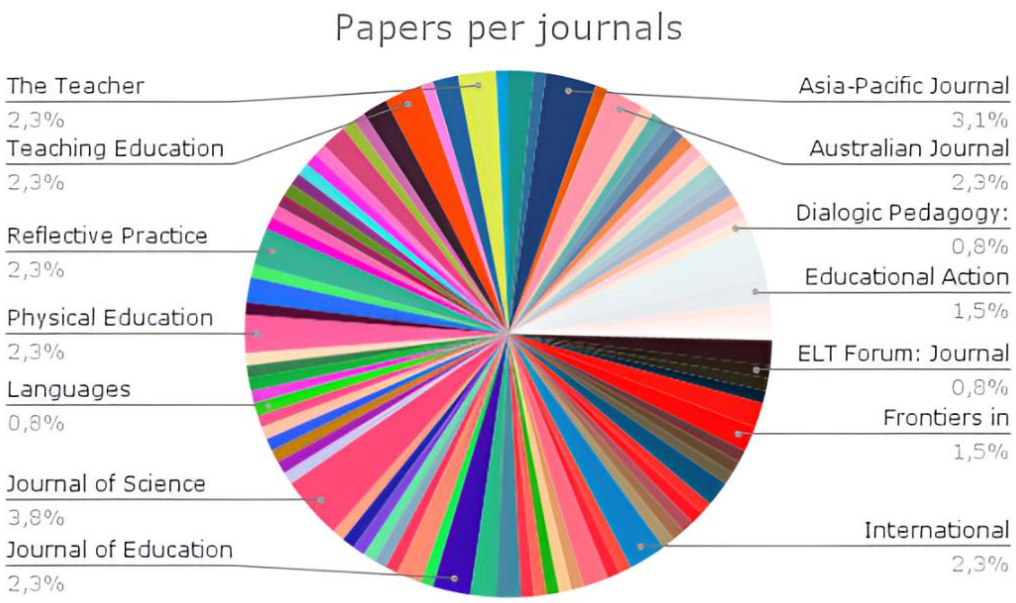
Note: own elaboration.

Graphic 4 displays the nine journals with the highest number of publications, ranked according to their contribution to the dataset, from highest to lowest, were International Journal of STEM Education (n = 9), Journal of Science Education and Technology (n = 5), International Journal of Technology and Design Education (n = 4), Journal of Baltic Science Education (n = 4), British Journal of Educational Technology (n = 3), Teachers College Record (n = 3), International Journal of Engineering Education (n = 3) and Journal of Educational Research (n = 3).

Graphic 2

Chart of journals with more than one article dedicated to the topic under analysis

Note: own elaboration.



Geographic situation

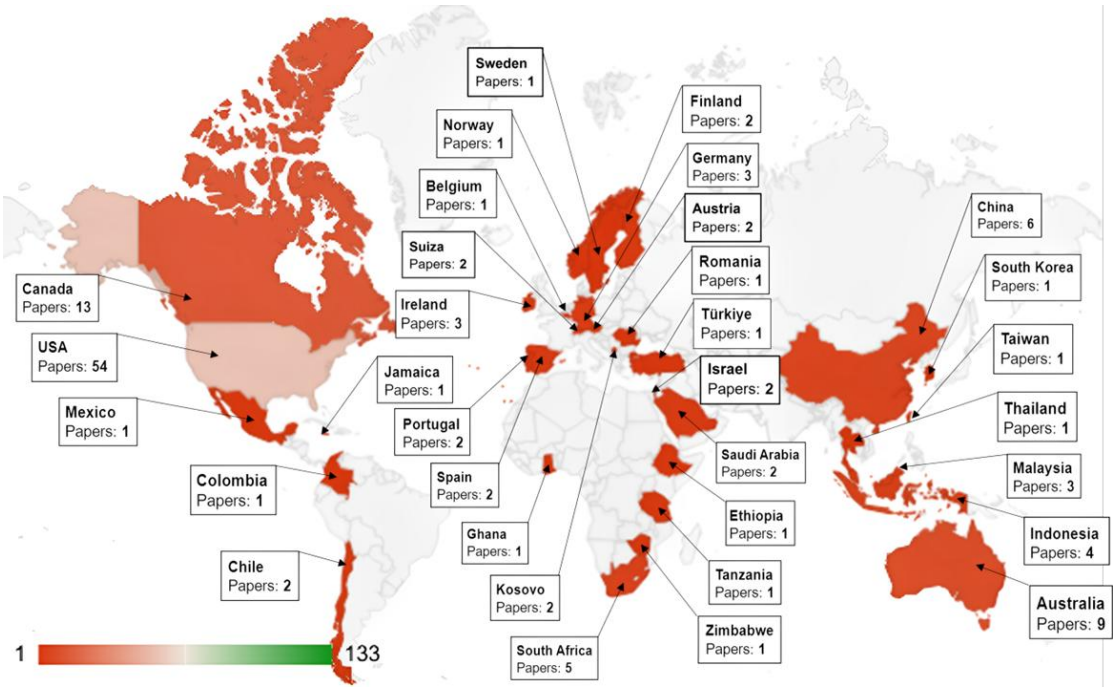
The studies were carried out globally and 31 countries are shown in Fig. 5, which shows the distribution of geographic contexts. Most studies were conducted in the United States (n=54), followed by Canada (n=13), Australia (n=9), China (n=6), South Africa (n=5), Indonesia (n=4), Germany, Ireland, and Malaysia (n=3), Saudi Arabia, Chile, Spain, Finland, Israel, Kosovo, Suiza, Austria and Portugal (n=2). Similarly, Belgium, Colombia, Ethiopia, Ghana, Sweden, Jamaica, Mexico, Norway, South Korea, Romania, Thailand, Taiwan, Tanzania, Türkiye and Zimbabwe (n = 1).

RESULTS

This section presents the qualitative findings of the systematic review, which were derived from the thematic analysis of the included studies. The qualitative results are organized around the main themes that emerged from the response of the studies to the research question regarding the challenges faced by pre-service teachers in planning and executing teaching practicums. Each theme reflects a key area of concern identified across the studies, with detailed responses on how these challenges manifest in different educational contexts. The themes are structured to provide a coherent narrative on the factors that hinder or support the effectiveness of teaching practicums, as reported in the literature.

Figure 3

Production of scientific articles related to the challenges of pre-service teachers in planning and carrying out teaching practices



Note: own elaboration.

Challenges in teaching practicum and school organization

The present section addresses the challenges and obstacles encountered by pre-service teachers during their pre-service practicum, drawing upon relevant literature (Frederick et al., 2016; Maher & Zollman, 2021; Durham et al., 2019; Peña-Sandoval, 2019; Saavedra-Jeldres & Campos-Espinoza, 2019). Through a comprehensive examination of these sources, a diverse array of challenges emerges. Preservice teachers struggle with collaboration, especially in inclusive environments, and designing effective STEM lessons. Their beliefs about teaching can be low, and they may lack the ability to fully engage students or implement specific pedagogies effectively. Cultural barriers, student behavior management, and adapting their emotions further complicate their experience (Manasia et al., 2019). Effective management of these diverse challenges is essential to preservice teachers' development as future educators. These challenges fall into four primary categories: teacher training, school organization, school resources, and mentoring and institutional support. It is important for teacher training programs to be aware of these challenges and to provide pre-service teachers with the support they need to succeed. These challenges are presented in Table 1, organized into four categories.

Table 1

Grouping the challenges of teaching practicum and school organization

Categories	Challenges/Obstacles
Teacher training	Curriculum reduction and conceptualization of literacy
	Inadequate awareness of students' lives and literacy
	Difficulties in adapting to student-centered learning and holistic assessment strategies
	Scarcity of suitable curricular and assessment resources
	Deficit-based beliefs
	Limited professional development
	Exposure to linguistic diversity
	Discriminatory attitudes
	Challenges in adapting to emerging educational paradigms
	Derth of suitable curricular and assessment resources
School organization	Lesson planning
	Parking availability
	Broader logistical concerns
School resources	Lack of school resources, skills, and teaching materials for different types of students
	Challenges in multimodal and technological resources
	Lack of Internet connectivity
	Limited access to electronic devices
	Failure of technology to apply their knowledge and training in classrooms
	Use of tangible objects as teaching tools in the classroom
	Ability to maintain student attention on the class
	Little self-control of the students when using technological devices in class
	Large number of students
Tutoring and institutional support	Deficiency of robust mentoring and support relationships provided by the educational institution

The management of time and classroom emerges as a key theme presenting challenges for teachers, particularly those in training (Scott et al., 2014; An et al., 2016; Enugu & Hokayem, 2017; Valtonen et al., 2020; Dubek & Doyle-Jones, 2021; Kinskey & Zeidler, 2021; Kozikoglu & Senemoglu, 2021; Thomas & Talbot, 2021). Teachers encounter difficulties in managing student activities and the time required to complete tasks and activities within the classroom. Collaborating with colleagues who do not share the same pedagogical approach and handling students with special needs also require considerable time investment. Pre-service teachers grapple with challenges in diverse classrooms and manage lesson time effectively. Classroom management issues, such as lack of instructional materials, inadequate time, poor planning, and insufficient administrative support and guidance, further complicate the teaching process (Amankwah et al., 2017; Kozikoglu & Senemoglu, 2021). Additionally, the transition between campus and field classes, parking, and inexperience in effective time planning pose significant challenges (Kozikoglu & Senemoglu, 2021; Symons et al., 2020). Addressing these challenges contributes to improvements in teaching practices and enriches the teaching and learning experience.

Challenges in teaching and teaching practicum

Pre-service teachers face numerous challenges during their practicum, impacting both their self-efficacy and effectiveness. These challenges can be categorized into four main areas:

Self-Efficacy: In this theme, the subcategories of perceived self-efficacy of pre-service teachers emerged (Capobianco & Radloff, 2021; Ciampa & Gallagher, 2017; Duran et al., 2020; Hawkman et al., 2019; Hollingsworth & Knight-McKenna, 2018; Lourenço, 2021; Oh et al., 2017; Strangeways, 2017) show a general concern about the lack of confidence of future teachers in their abilities to teach and

manage the classroom. In addition, pre-service teachers' self-efficacy challenges (Brown et al., 2015; Pugach & Peck, 2016) suggest that they face specific difficulties in classroom management, curriculum planning, and student relationships.

Lack of confidence in teaching and managing the classroom (Ciampa & Gallagher, 2017; Boz et al., 2019; Capobianco & Radloff, 2021).

Difficulties in specific areas like classroom management, curriculum planning, and student relationships (Brown et al., 2015; Pugach & Peck, 2016; Santoyo & Zhang, 2016; Brinkmann, 2019; Hodges et al., 2022).

Lack of knowledge in specific subjects (Anderson et al., 2022; Menon & Azam, 2021; Trauth-Nare, 2015).

Importance of support from mentors and institutions for self-efficacy development (Nikoçeviq-Kurti & Saqipi, 2022).

21st Century Skills: In this subcategory, the importance of integrating skills such as critical thinking, problem solving, collaboration, creativity, and the use of technology into educational planning and teaching is highlighted.

Integrating critical thinking and computational, problem-solving, collaboration, creativity, and technology into teaching (Valli et al., 2014; Liu, 2016; Tondeur et al., 2020; Ateşkan & Hart, 2021).

Challenges in promoting creativity and achieving effective teamwork, particularly within diverse groups (Kimhi & Geronik, 2020; Loo et al., 2019; Lourenço, 2021; Rusznyak & Bertram, 2021).

Interpersonal Interactions and Communication: According to studies that addressed the interpersonal interactions and communication in teaching practicum (Crawford-Garrett et al., 2015; Oh et al., 2017; Rusznyak & Walton, 2017; Lew & Siffrinn, 2019; Duran et al., 2020; Kozikoglu & Senemoglu, 2021; Nikoçeviq-Kurti, 2023;), miscommunication and disagreements between advisory teachers and pre-service teachers are frequently encountered difficulties.

Miscommunication and disagreements with cooperating teachers (Duran et al., 2020; Kozikoglu & Senemoglu, 2021; Lew & Siffrinn, 2019; Nikoçeviq-Kurti, 2023; Oh et al., 2017; Rusznyak & Walton, 2017).

Difficulties in self-assessment and bilingual communication (Lew & Siffrinn, 2019; Lee et al., 2021; Carter & Abbott, 2023).

Challenges in lesson planning, ICT integration, classroom management, and cultural/linguistic diversity (Altalhab et al., 2021; Clark et al., 2015; Kruse et al., 2022; McGarr, 2020; Rao et al., 2021; Rehmat & Bailey, 2014; Zhang, 2019).

Difficulties building relationships with students and managing discipline (White, 2021)

STEAM and Online education: The incorporation of STEM into classroom planning and implementation subcategory examines the challenges teachers face in effectively including STEM. (science, technology, engineering, and mathematics) in their teaching plans and in the classroom (Enugu & Hokayem, 2017; Lawson et al., 2021; Vumilia & Semali, 2016). Difficulties include a lack of STEM skills (Lawson et al., 2021) and adequate teaching materials, as well as the need to bridge subject knowledge with pedagogy.

Pre-service teachers encounter various challenges during their practicums, depending on the environment they are placed in. In rural settings, limitations in resources, support networks, and understanding of students' backgrounds pose significant difficulties (Duran et al., 2020; Young et al.,

2018). Geographic isolation further hinders effective teaching implementation (Duran et al., 2020). Additionally, integrating STEM education can be challenging due to limited technology and resources (Lawson et al., 2021).

Online education presents a different set of challenges. Pre-service teachers struggle with aspects like lesson planning, student discipline management, and adapting to the lack of direct student interaction (Hendry et al., 2022). Low levels of readiness for distance learning and boredom in online environments further complicate their experience (Hendry et al., 2022; Friskawati, 2021). Managing online platforms, technical issues, and limited access to virtual classrooms add to the burden (Friskawati, 2021).

It's important to note that pre-service face challenges in planning and executing teaching, regardless of the setting. Common areas of concern include lesson planning, co-teaching, lesson design, integrating literacy and STEM, classroom management, and documenting/presenting teaching practicum (Howard & Guidry, 2017; Sawyer & Myers, 2018; Maiorca & Mohr-Schroeder, 2020; Dubek & Doyle-Jones, 2021; Kinskey & Zeidler, 2021; Hendry et al., 2022). Additionally, challenges in managing emotional and cognitive frustrations in students are prevalent (Lew & Siffrinn, 2019; Macken et al., 2020). Table 2 present a summary of challenges for pre-service teachers in STEAM and Online education.

Table 2

Summary of challenges for pre-service teachers in STEAM and Online education

Environment	Key Challenges
Rural	Limited resources, support networks, and understanding of students' backgrounds, geographic isolation, integrating STEM education.
Online	Lesson planning, student discipline management, lack of direct student interaction, low readiness for distance learning, boredom and lack of engagement, online class administration, technical resource constraints.
Urban	Lesson planning, co-teaching, lesson design, integrating literacy and STEM, classroom management, handling emotional/cognitive frustrations, documenting/presenting teaching practicum, planning and developing classes, aligning coursework with practice, integrating STEAM/makerspace environments.

The synthesis reveals several key chall encountered by both pre-service and experienced teachers in the realm of teaching planning and execution. Challenges in lesson planning, co-teaching, lesson design, and integrating literacy and STEM strategies emerge as significant areas of concern (Howard & Guidry, 2017; Sawyer & Myers, 2018; Maiorca & Mohr-Schroeder, 2020; Dubek & Doyle-Jones, 2021; Kinskey & Zeidler, 2021; Hendry et al., 2022). Additionally, difficulties in classroom management and handling emotional and cognitive frustrations are notable challenges (Lew & Siffrinn, 2019; Macken et al., 2020). The category also covers challenges in documenting and presenting the teaching practicum, including evidence collection and portfolio creation. (Clark-Gareca, 2015). Challenges in planning and executing teaching within pedagogically restrictive environments and issues concerning classroom management, lesson planning, and organization further compound the complexities faced by teachers (DeLuca et al., 2015; Eckhoff, 2017; Lew & Siffrinn, 2019; Kozikoglu & Senemoglu, 2021). Lastly, the category delves into challenges related to planning and developing classes, such as aligning coursework with real-world field practice, integrating STEAM and makerspace environments, understanding local curricula, and 21st-century teaching and learning theories (Tan et al., 2020; Rao et al., 2021; Shively et al., 2021; Krepf & König, 2022; McNeilly et al., 2022).

Challenges in distance and online education

Distance learning modalities have seen widespread adoption across educational settings, a trend that the COVID-19 pandemic further intensified. Pre-service teachers often begin their online practicum

without a sufficient foundation in digital pedagogical methods and with limited proficiency in instructional technologies, which restricts their ability to design engaging learning activities and to provide timely formative feedback (Hendry et al., 2022). Infrastructural deficiencies—such as unstable internet connectivity, intermittent electrical supply, and limited access to appropriate devices—further hinder both instruction and student engagement, with particularly severe effects in under-resourced regions (Drajati et al., 2021; Sunzuma et al., 2022). These constraints prove even more acute in early childhood education, where the adaptation of inquiry-based and play-oriented pedagogies to fully remote contexts requires advanced technical skill and specialized instructional design frameworks to preserve creativity and exploration (Kimhi & Geronik, 2020; Broza et al., 2022).

The sudden transition to remote instruction exacerbated these challenges. Pre-service teachers were frequently tasked with converting face-to-face curricula into digital formats without adequate preparation or institutional support, resulting in fragmented curriculum implementation and weakened management of virtual classrooms (Black, 2015; Brinkmann, 2019; Chandra & Lloyd, 2020; Cruickshank & Mainsbridge, 2022; Mikeska et al., 2023). Reliance on improvised communication tools—especially generic messaging applications—for essential instructional functions and assessment has been linked to diminished teacher self-efficacy and increased professional isolation (Amir et al., 2017; Sunzuma et al., 2022).

Mitigating these shortcomings demands a comprehensive strategy. It should include systematic training in digital pedagogy, investment in stable technological infrastructure, and the creation of structured mentoring programmes. These measures enable pre-service teachers to maintain consistency, pedagogical rigor, and instructional quality in online settings (Chan, 2020; Deroo, 2022; Hendry et al., 2022).

Challenges in critical and reflective thinking in teaching practicum

Critical and reflective thinking is a fundamental aspect in teaching practicum and represents a challenge for pre-service teachers (Haberlin, 2018). Adaptive and receptive learning, reflective practice and the incorporation of higher order thinking are skills that need to be developed in pre-service teachers to effectively teach multicultural students and students with special educational needs (Kimhi & Geronik, 2020). In addition, pre-service teachers face difficulties in the practical application of their knowledge and skills, as well as in critical reflection on their teaching practicum (Brown et al., 2015; Ong et al., 2020; Choy et al., 2021;). Pre-service teachers experience a lack of support to develop their critical and reflective thinking in teaching practicum and often lack the ability to carry out adequate reflection on their own teaching. It is essential that teacher education programs incorporate the teaching of reflective and critical thinking skills so that future teachers can teach effectively and meet the needs of students in a changing educational environment (Brown et al., 2015; Thani & Homaid, 2018; Choy et al., 2021).

Teaching can be an emotionally demanding task, and pre-service teachers face several emotional and motivational challenges. Regarding emotional frustrations, some of the challenges include pre-service teachers' perceived self-efficacy in their teaching practicum (Anderson et al., 2022), their perceived self-efficacy in teaching (Trauth-Nare, 2015), and their beliefs of self-efficacy in teaching (Menon & Azam, 2021). Furthermore, self-efficacy and prior knowledge can be a challenge in teaching inquiry (Mouza et al., 2014). In terms of lack of motivation and experience, pre-service teachers may not have inadequate motivation, knowledge, and experience to change their practices and are risk averse for fear of damaging their confidence (Stahl et al., 2016). In general, these emotional and motivational challenges can have a significant impact on the success and satisfaction of pre-service teachers in their teaching practicum.

Pre-service teachers face multiple challenges in their adaptation to the teaching work environment and the learning environment, as well as in the construction of their professional identity. In the social sphere, challenges arise from both the situated learning environment of professional experience and the personal sphere of professional identity (Strangeways, 2017). In addition, pre-service teachers may have little knowledge about the school culture, which can make it difficult for them to adapt to the work environment (Scott et al., 2014). In addition, the adaptation to the geographical/physical characteristics of the region where they work, the relations with society, the organization of the educational environment, and the physical deficiencies of the classes and didactic materials, are important aspects that must also be considered (Addleman et al., 2014). Taken together, these challenges can make it difficult for pre-service teachers to successfully transition into the teaching work environment, requiring adequate support and training from educational institutions (Addleman et al., 2014; Scott et al., 2014; Strangeways, 2017).

Diversity and Inclusion Challenges in the Classroom

The presence of diversity in the classroom presents a persistent challenge for both pre-service and practicing teachers. Educators grapple with various aspects of classroom and time management, the absence of constructive feedback from advisory teachers, and the intricacies of effectively accommodating students with special needs (Duran et al., 2020). Moreover, pre-service teachers may encounter difficulties in engaging in self-assessment to offer peer feedback and effectively implementing pre-writing activities (Rusznyak & Walton, 2017). These challenges illustrate the complexity of the teaching profession and the varied demands it imposes on pre-service teachers during their practicum (Evagorou & Puig, 2016).

In the domain of special education, providing effective support for students with special learning needs poses a significant challenge (Lourenço, 2021). Moreover, pre-service teachers encounter difficulties in effectively teaching multicultural students and those with special educational needs (Kimhi & Geronik, 2020). Pre-service teachers encounter several challenges related to cultural diversity. They confront racialization processes affecting specific racial and gender groups in urban classrooms and must manage intercultural tensions and discriminatory practices (Maddamsetti, 2023). Establishing collaborative relationships among teaching staff to support inclusive pedagogy further complicates these dynamics (Hellmich et al., 2021).

Linguistic and cultural barriers also emerge as obstacles, where the inability to communicate proficiently in English and navigate culturally different contexts can hinder both learning and teaching processes (Jin et al., 2020; Loo et al., 2019). Furthermore, limited technological infrastructure poses challenges in the domain of intercultural and non-native language education (Hadjistassou & Allen, 2018). These various challenges underscore the complexities that educators face in promoting inclusive and effective learning environments, requiring comprehensive strategies and interventions to address the diverse needs of students from different linguistic and cultural backgrounds.

An et al. (2016) recommend that learning tasks for gifted students need to be modified to meet their needs, provide culturally relevant instructional materials to accommodate students with a variety of cultural backgrounds, and offer differentiated instruction for students with different levels of mathematical abilities. Nonetheless, lack of time during activities and assessment can be obstacles in this process. Moreover, communication with students who have language barriers, such as English learners, can present a significant challenge in education. Finding ways to communicate effectively with these students is essential to ensure their full participation in learning.

In the category related to students and diversity in education (Valério et al., 2022), mention is made that the course units can be disconnected and that a lack of dialogue exists in the teaching practicum by the advisory teacher. Collaborating as a team is important to address these challenges. Furthermore,

technology can be a useful tool to engage students in learning and to create an inclusive environment. The article (Anne, 2014) focuses on students' perception of responsiveness in education and their behavior, including difficulties with emotional regulation and social interactions. Teachers' lack of understanding of constructivist instruction and pedagogical self-efficacy are also discussed, as well as their own authority with children and lack of clarity about their role in practice.

In the category related to the need to serve students with disabilities, especially the need for interdisciplinary collaboration between general and special education to meet the needs of these students. However, the article Pugach and Peck (2016) highlights the cultural and organizational challenges that arise in the collaboration between these two areas.

On the other hand, a category emerged that describes situations where trainee teachers face the challenge of recognizing discriminatory, undemocratic, and unequal ideologies throughout the current educational system. Barbosa and Wang (2020) examine this challenge and contend that identifying these ideologies is necessary to advance a more inclusive educational environment. Finally, (Maddamsetti, 2020) describes the racial hierarchical structure in fieldwork, suggesting that race remains a significant issue in education and that continued attention is required to address these challenges.

DISCUSION

Our systematic review indicates that resource constraints, digital readiness, and mentor support jointly influence pre-service teachers' self-efficacy and instructional performance. This model corresponds with the resilience framework proposed by Castro et al. (2018), who posited that material limitations and socio-emotional support co-determine novice teachers' adaptive capacity in demanding settings . Similarly, Kakazu and Kobayashi's (2023) case study revealed that temporal pressures and limited institutional support impair reflective practice . Whereas Silva et al. (2021) concentrated on classroom management and pedagogical knowledge, the present review broadens the scope by incorporating the technical requirements of digital infrastructure as a key theme.

Restricted device availability and variable connectivity were repeatedly identified as barriers to lesson implementation (Sunzuma et al., 2022; Hendry et al., 2022) . The current findings confirm these observations and further demonstrate that such limitations diminish pre-service teachers' adaptive responses when planned activities fail to execute as intended. This extends Silva et al.'s (2021) analysis by establishing a causal link between technological deficits and reduced self-efficacy .

Evidence from McNeilly et al. (2022) suggests that structured collaborations between universities and schools enhance novice teachers' professional learning , and the data presented here show that purposefully designed mentoring initiatives can alleviate the adverse impacts of resource shortages and technical challenges. Mentors who deliver targeted feedback alongside sustained emotional encouragement enable pre-service teachers to reframe obstacles as opportunities for pedagogical problem-solving rather than as insurmountable setbacks. This interpretation extends Tondeur et al.'s (2020) focus on technological pedagogy training, illustrating the role of socio-emotional support in developing resilience.

Teacher-education programs are therefore advised to implement comprehensive strategies that enhance technological infrastructure—securing reliable connectivity and equitable access to devices—embed practical digital-pedagogy workshops within practicum sequences to translate theory into practice, and establish formal mentoring structures that integrate instructional guidance with ongoing psychosocial support .

This review predominantly incorporates research conducted in high-income contexts; subsequent studies should examine how these factors interact in under-resourced environments. Longitudinal research designs will also be necessary to evaluate the sustained effects of integrated supports on teacher retention and student learning outcomes.

Comparison with Castro et al. (2018), Kakazu & Kobayashi (2023), and Silva et al. (2021) confirms that resource limitations, digital readiness, and mentor support form an interdependent system whose combined influence determines pre-service teachers' capacity to translate lesson planning into effective classroom practice. Addressing these interconnected elements collectively offers a coherent approach for enhancing pre-service teacher preparation and improving educational outcomes.

CONCLUSIONS

This systematic review represents a significant contribution to the existing body of knowledge by conducting a comprehensive analysis of the barriers encountered in planning and executing teaching practices within teacher training programs. This study investigated the principal challenges pre-service teachers encounter in planning and executing teaching practicums, identifying five interrelated dimensions that shape their practicum experiences.

First, pre-service teachers frequently confront classroom management and discipline challenges that disrupt instructional continuity and undermine teaching quality. They must allocate limited class time among diverse activities, coordinate with co-mentors who employ differing pedagogical approaches, and support learners with special needs under conditions of scarce material resources and minimal administrative oversight.

Consequently, instructional planning emerges as an additional obstacle. Dependence on generic lesson-plan templates or the absence of clear methodological frameworks undermines both the coherence and contextual relevance of lesson sequences, hindering the design of authentic, learner-centered tasks.

Furthermore, technological infrastructure and resource availability represent foundational prerequisites for effective practicum enactment. Connectivity interruptions, unequal access to electronic devices, and the lack of integrated learning platforms compel reliance on non-specialized tools, thereby limiting both synchronous and asynchronous instructional modalities as well as the integration of multimodal resources.

Equally important are self-efficacy and institutional support, which mediate novice teachers' responses to material and technical barriers. Structured mentorship programs—combining formative feedback with psychosocial guidance—strengthen confidence in classroom management and lesson delivery, whereas the absence of such support tends to amplify perceptions of professional inadequacy.

Finally, the COVID-19 pandemic exposed and exacerbated gaps in digital-pedagogy preparation and technological readiness. The abrupt shift to online instruction, substitution of formal platforms with messaging applications, and recurring connectivity failures increased frustration and strained teacher–student relationships.

These findings demonstrate the need for integrated, multidimensional interventions. First, programs must ensure reliable technological conditions. Second, they should embed practical digital-pedagogy training within practicum sequences. Third, they must establish structured mentorship programs that combine instructional guidance with socio-emotional support. Such a coordinated strategy is essential to translate lesson planning into effective classroom practice and to enhance teaching quality across diverse educational settings.

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