

Didactics and Pedagogical Trends from the Perspective of Pre-service Biology Teachers

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ABSTRACT

This study sought to investigate how pre-service Science teachers understand key concepts underlying teaching practice, particularly those related to pedagogical knowledge, namely Didactics and Pedagogical Trends. The corpus of analysis consisted of internship reports produced by five undergraduate students enrolled in a Biological Sciences Teacher Education program at a public university in western Paraná, Brazil, as well as transcripts of semi-structured interviews conducted with these participants. Through Discursive Textual Analysis (DTA), the final category entitled “What Is This So-Called Pedagogical Knowledge?” emerged from the data. The findings indicate that the participants confuse the concept of pedagogical trends with teaching methodology and the concept of didactics with pedagogy. It was concluded that their understanding of these concepts remains incomplete, highlighting the need for a clearer understanding of pedagogical knowledge, since conceptual clarity may foster a more reflective, critical, and transformative approach to teaching practice.

RESUMO

Este artigo buscou compreender como os futuros professores de ciências percebem determinados termos fundamentais da prática docente, em especial aqueles relacionados aos conceitos pedagógicos, a saber: Didática e Tendências Pedagógicas. Constitui-se como corpus de análise os relatórios de estágio de cinco acadêmicos do curso de Licenciatura em Ciências Biológicas de uma universidade pública do oeste paranaense, além das transcrições de entrevistas semi-estruturadas com estes participantes. Por meio da Análise Textual Discursiva (ATD), emergiu a categoria final denominada como “O que é isso que se chama por conhecimento pedagógico?”. Os resultados demonstram que os participantes confundem os conceitos de tendência pedagógica com metodologia de ensino e didática com pedagogia. Considerou-se que a apreensão desses conhecimentos ainda se mostra incompleta, apontando para a necessidade de melhor esclarecimento do que são os conhecimentos pedagógicos, pois a clareza conceitual pode auxiliar em um processo reflexivo sobre a própria prática mais diligente, crítico e transformador.

ARTICLE INFORMATION

Article History:

Submitted: 06/30/2025

Approved: 02/27/2026

Published: 06/30/2026



Keywords:

Pedagogical Knowledge,
Curricular Internship,
Teaching Practice

Palavras-Chave:

Conhecimentos
Pedagógicos, Estágio
Curricular, Prática Docente

Introduction

A widespread belief rooted in common sense yet considered problematic by some researchers (Shing; Saat; Loke, 2015), is the assumption that teaching is merely the ability to tell stories. Similarly, it is common to believe that mastering subject content alone is sufficient to become a teacher (Fernandez, 2015). However, such perceptions oversimplify the teaching profession and hinder the understanding of the educational processes that are essential for developing the knowledge required for effective teaching, including the ability to transform disciplinary knowledge into teachable knowledge.

Arrigo (2021) argues that the core of teaching practice lies in both subject matter knowledge and its transformation into teachable knowledge while taking into account the specific characteristics of the educational context, the students, and the curriculum. This transformation is grounded in pedagogical knowledge, that is, comprehensive knowledge encompassing an understanding of the processes, practices, and methods involved in teaching and learning, as well as issues related to teachers' professional stance, classroom management, instructional planning, student assessment, among others (Mishra; Koehler, 2006). Nevertheless, it is not sufficient for this knowledge to remain tacit and intrinsic to teaching practice. It is also important to understand how it is conceptually perceived by pre-service teachers, since such perceptions may reveal a wide range of conceptions regarding the teaching profession.

This article stems from a study conducted within a graduate program in Science Education that sought to understand how undergraduate students enrolled in a Biological Sciences Teacher Education program, who had completed the Supervised Science Teaching Internship, perceive Teaching Methodology. However, other fundamental concepts related to teaching practice also emerged from the participants' accounts, including Didactics and Pedagogical Trends. These concepts constitute the focus of the present study.

Accordingly, this article aims to examine how Pedagogical Trends and Didactics are understood by pre-service Biology teachers and how these concepts are articulated throughout the Supervised Science Teaching Internship. We argue that investigating how pedagogical knowledge is understood during initial teacher education can provide valuable insights into both the strengths and limitations of teacher education programs. Furthermore, such an investigation contributes to a better understanding of how future Science teachers are being prepared within the field of Science Education.

Theoretical Framework

Teaching is a complex professional activity that requires a broad range of knowledge to be effectively carried out. Although there is considerable debate regarding the nature of teachers' knowledge base, four broad domains are generally recognized as fundamental to the

teaching profession: content knowledge, pedagogical knowledge, pedagogical content knowledge, and contextual knowledge (Arrigo, 2021).

From this perspective, mastering the scientific discipline one teaches is not sufficient; teachers must also understand how to make that knowledge accessible to learners (Mizukami, 2004). As Shulman (1987) argues, effective teaching requires knowledge of subject matter, curriculum, general pedagogical principles, and the specific educational context in which teaching takes place.

But what exactly do these disciplinary, content-specific, and pedagogical forms of knowledge entail? Indeed, this is a broad and multifaceted field, and many scholars have sought to define the knowledge considered essential for the teaching profession, including Shulman, Tardif, Schön, among others. In the present study, however, we draw primarily upon Shulman's (1987) framework to understand Pedagogical Content Knowledge (PCK).

In general terms, PCK represents the integration of content knowledge—that is, knowledge of the scientific subject to be taught—and pedagogical knowledge, which encompasses the processes of teaching and learning (Cibotto & Oliveira, 2017). Whereas the former requires epistemological, methodological, and factual mastery of a given field of knowledge, the latter involves the knowledge and skills necessary for instructional planning, classroom management, the selection of appropriate teaching strategies and instructional resources, and the assessment of student learning (Cibotto & Oliveira, 2017).

Thus, PCK goes beyond viewing content knowledge and pedagogical knowledge as isolated domains. Rather, it constitutes an integrated body of knowledge aimed primarily at promoting student learning (Mazon, 2012).

According to Cibotto and Oliveira (2017), all these forms of knowledge are indispensable to professional teaching practice and complement one another throughout teachers' professional work. Nevertheless, Libâneo (2012) criticizes prevailing teacher education models. According to the author, Pedagogy programs tend to place greater emphasis on general pedagogical knowledge while devoting comparatively less attention to discipline-specific content knowledge. Conversely, the opposite situation is observed in discipline-specific teacher education programs.

Within the context of the present investigation, our interest lies in understanding how pre-service Science teachers perceive concepts that we consider fundamental to teaching practice—namely, Didactics and Pedagogical Trends—particularly those associated with pedagogical knowledge. We argue that a sound understanding of these concepts is essential for effective teaching practice, as it helps overcome the traditional dichotomies between theory and practice, content and pedagogy, and disciplinary and pedagogical knowledge.

Methodological Procedure

This article is based on a qualitative research study, in which the investigative process seeks to construct an understanding from the participants' perspectives (Bogdan & Biklen, 1994). The study was conducted at a public university in the state of Paraná, Brazil.

Grounded in Phenomenology, understood as the analysis of the ways in which phenomena appear to consciousness—that is, how they are perceived (Zahavi, 2019)—the initial phenomenon investigated was the way in which the concept of Teaching Methodology is perceived by undergraduate students enrolled in a Biological Sciences Teacher Education program who completed the Supervised Science Teaching Internship during the 2021 academic year.

In accordance with ethical research procedures, all participants voluntarily signed an Informed Consent Form, which outlined the objectives, rationale, and methodological procedures of the study. The corpus consisted of internship reports (including the introduction, lesson plans, and final considerations) and transcripts of remotely conducted semi-structured interviews. This interview format enables researchers and participants to co-construct data through a dialogical process (Zanette, 2017).

Data were analyzed using Discursive Textual Analysis (DTA), as proposed by Moraes and Galiazzi (2016). The analytical process comprises three main stages. The first, unitization, involves fragmenting the research corpus—in this case, five interviews and five internship reports—into Units of Meaning (UMs). The second stage, categorization, consists of grouping the Units of Meaning according to their similarities, leading to the development of initial, intermediate, and final categories. The third stage involves the construction of a metatext, in which the researcher seeks to generate new interpretations and meanings regarding the phenomenon under investigation.

As part of the DTA procedure, each Unit of Meaning was assigned an identification code indicating both its origin and its location within the corpus. The coding system consisted of a character identifying the type of document ("R" for internship reports and "I" for interviews), followed by the participant's identification within the Supervised Science Teaching Internship ("SCI"), the sequential number assigned to each participant (e.g., "05"), the abbreviation UM (Unit of Meaning), and a final number identifying the position of the excerpt within the document (e.g., "05"). After the coding process, all documents were organized and analyzed using ATLAS.ti software.

Although the initial phenomenon of interest was the way in which the concept of Teaching Methodology (TM) is perceived, the analysis of the interviews and internship reports also revealed participants' perceptions regarding Didactics and Pedagogical Trends. Consequently, through the progressive integration of the initial and intermediate categories, the final category entitled "What Is This So-Called Pedagogical Knowledge?" was constructed. This category brings together the perceptions of undergraduate students in a Biological

Sciences Teacher Education program concerning some of the fundamental concepts underlying teaching practice. The development of this final category is presented in Table 1 below.

Table 1.

Development of the Final Category "What Is This So-Called Pedagogical Knowledge?"

Initial Categories	Intermediate Category	Final Category
Conceptualizing Didactics (6 UMS)		
Conceptualizing Pedagogical Trends (7 US)	What Do They Mean by...? (13 UMs)	What Is This So-Called Pedagogical Knowledge? (13 UMs)

Note: Prepared by the authors (2025).

In light of the foregoing, the ways in which the participants perceive key pedagogical concepts—namely, Pedagogical Trends and Didactics—and how they articulate this knowledge throughout the Supervised Science Teaching Internship are described and interpreted in the following section.

Results and Discussion

The final category, "What Is This So-Called Pedagogical Knowledge?", brings together the perceptions of pre-service Biology teachers regarding concepts considered fundamental to the teaching profession, particularly Didactics and Pedagogical Trends (PTs).

When examining official educational documents, such as schools' Political-Pedagogical Projects (PPPs) and state curricula, the participants recognized the widespread adoption of Historical-Critical Pedagogy as the guiding theoretical framework. This perception is illustrated in IEC02UM62: "After looking at other PPPs from different schools, and also in the methodology classes we had at the university, they told us that practically every school's PPP is based on Historical-Critical Pedagogy." (IECo2UM62)

However, the participants' statements also reveal that the term Historical-Critical Pedagogy is understood as a Teaching Methodology (TM) rather than as a pedagogical trend. This misconception is evident in the following statement: "Well, there are other methodologies besides Historical-Critical Pedagogy." (IECo2UM62) This finding indicates a degree of conceptual confusion between the notions of Pedagogical Trends (PTs) and Teaching Methodology (TM).

Such terminological confusion is relatively common, precisely because education is a broad and multifaceted phenomenon characterized by a wide range of concepts and terminology (Paz, 2024). Nevertheless, it is important to recognize that, because education is multidimensional, it encompasses diverse epistemological perspectives—that is, different ways of understanding how human knowledge is constructed—which, in turn, influence how society and its members are perceived and organized. Consequently, these epistemological perspectives also shape conceptions regarding the social function of education, the

organization of educational systems, and the teaching profession itself. In other words, every educational model is underpinned by a particular epistemological framework (Behrens, 2009).

Farias et al. (2009) refer to these multiple dimensions as theoretical frameworks, arguing that they shape the educational projects of a given historical period. In other words, they influence how education is organized, how teacher education is conceived, and how teaching practices are carried out. The authors define these theoretical frameworks as "a set of ideas, values, and conceptions of human beings and society that underpin ways of interpreting and defining directions for the educational process" (Farias et al., 2009, p. 31). These theories—referred to here as theoretical frameworks or theoretical approaches—give rise to what are known as Pedagogical Trends (PTs), a term adopted in this study to designate the broad theoretical framework that underpins pedagogical practice.

In turn, Teaching Methodology (TM) can be understood as a set of principles and procedures—that is, the integration of theory and practice—that guides instructional planning and pedagogical practice (Paz, 2024). Each Pedagogical Trend (PT) embodies a particular conception of Teaching Methodology. Accordingly, within the Traditional Pedagogical Trend, teaching methodology is characterized by standardized procedures centered on teacher exposition. In the Technicist Pedagogical Trend, the emphasis is placed on technical improvement and the effectiveness of teaching and learning through the use of educational technologies. Conversely, the Liberating Pedagogical Trend is grounded in the problematization of social reality, aiming to promote critical reflection and social transformation (Mizukami, 1986; Manfredi, 1993; Becker, 2001; Behrens, 2009; Farias et al., 2009).

Based on the participants' perceptions, it is evident that the undergraduate students interpret Pedagogical Trends as Teaching Methodologies, demonstrating an incomplete understanding of these two fundamental concepts and, consequently, failing to recognize how pedagogical trends influence the methodological choices that shape teaching practice.

The participants' perceptions of Didactics also emerged from the data. This is another fundamental concept in teaching practice that, due to its multidimensional nature, encompasses a variety of meanings. Mesquita (2020) argues that an analysis of the concept of Didactics may begin with its grammatical usage, as it can function either as a noun or as an adjective. When used adjectivally, didactic refers to a particular way of teaching, generally emphasizing the teaching processes, techniques, and instructional tools employed (e.g., "That teacher is very didactic"). When used as a noun, however, Didactics refers to a field of knowledge that provides the epistemological foundation for teaching (Mesquita, 2020).

From this latter perspective, Didactics is understood as one of the branches of Pedagogy, responsible for "investigating the foundations, conditions, and modes of instruction and teaching" (Libâneo, 1994, p. 25). It serves as a bridge between theoretical principles and teaching practice and is regarded as a scientific field whose object of study is the teaching—

learning process (Fonseca & Fonseca, 2016). Based on the participants' statements, however, their perceptions align predominantly with the former understanding of Didactics, using the term as an adjective to describe what they consider to be a "good" or "innovative" lesson.

This perception is illustrated in UM ECO1UM10, where one participant describes the expectation, fostered during the teacher education program, of moving away from what is considered "traditional" teaching: "(We had) this idea in our heads that we were going to do something more didactic, that we were going to use different tools and all that... But when we got to the school, it was completely different... Completely different, you know? Mainly because of classroom indiscipline, wasn't it?" (IECO1UM10)

Thus, Didactics appears to be understood as something that stands in opposition to traditional teaching. But what exactly is meant by this traditional approach that should, at all costs, be avoided? In IECO1UM13, the participant suggests that what is conventionally referred to as traditional consists of teachers "standing at the front of the classroom [...] having students copy from the board," a practice justified by students' classroom indiscipline. Having students copy from the board and centering instruction on the teacher's exposition are viewed as ways of preventing the classroom from becoming, in the words of participant ECO1, "turning into chaos" (IECO1UM13).

According to ECO1's account, these characteristics correspond to what Krasilchik (2019) describes as the lecture method, which consists of informing students about a particular subject through explanations and the reproduction of textbook content, while students assume a predominantly passive role in the learning process. According to the author, this instructional approach remains widely used because it allows teachers to emphasize key aspects of the content, introduce new topics, synthesize concepts, and communicate their own professional experiences. Its widespread adoption is also associated with the possibility of teaching larger groups of students simultaneously while maintaining classroom control and limiting opportunities for student participation—precisely the reason highlighted by participant ECO1.

When analyzing the characteristics of the lecture method, we agree with the participant's account and argue that it can be situated within the Traditional Pedagogical Trend (PT), since instruction developed through this teaching approach places the teacher at the center of the educational process, assigning them the role of transmitting information while students are expected to receive it. Nevertheless, it is important to emphasize that traditional teaching should not be viewed as the opposite of Didactics. The former refers to teaching practice grounded in the Traditional Pedagogical Trend, with its own epistemological, political, and pedagogical assumptions. The latter, in contrast, may be understood as a body of knowledge dedicated to the study of different teaching and learning processes, including those developed from traditional educational perspectives.

The fact that participant ECO1 uses the term didactic as an adjective does not, however, constitute a conceptual inconsistency. Rather, it suggests an emphasis on the technical and

operational dimensions of Didactics, while overlooking its political-social dimension—which encompasses the cultural and contextual differences that permeate the teaching process—and its human dimension, related to the interpersonal and affective aspects of teaching (Candau, 1983).

The participants' perceptions also indicate that lessons considered to depart from traditional teaching are characterized by the use of different instructional tools, although neither these tools nor their intended pedagogical purposes are clearly specified. At the same time, student indiscipline is identified as a limiting factor for adopting a "more didactic" approach. This raises questions about what being more didactic actually means and highlights the persistent dichotomy between theory and practice in teacher education.

The data further reveal difficulties in understanding concepts commonly used in educational contexts. In IEC01UM33, one participant illustrates how these concepts become intertwined: "At first, it was also difficult for me to understand... like, what is Pedagogy? It's the theoretical part, and Didactics is the practical part, and the two... the two complement each other, you know?" (IEC01UM33) This statement reveals a dichotomous understanding in which Pedagogy is conceived as the theoretical component, whereas Didactics is viewed as its practical counterpart.

In the methodological procedures section of the lesson plans, the expression "didactic-pedagogical" is used. During the interviews, the participants later define this concept as "a set of tools and techniques to be applied by the teacher to transmit knowledge to students" (IEC01UM38).

Specifically, in EC01's lesson plans, under the section entitled Methodological Procedures, the term "didactic-pedagogical" (RECO1UM28) is employed as a synonym for Teaching Methodology (TM). During the interview, when asked to explain the meaning of this expression, the participant stated: "What does didactic-pedagogical mean? I think it is a set of tools and techniques that teachers apply to transmit knowledge to students." (IEC01UM38) The participant further added that it is impossible to "[...] use only Didactics or only Pedagogy, so in the end one complements the other." (IEC01UM38).

We concur with Libâneo (2005, p. 6), who argues that Pedagogy "[...] is a field of knowledge concerned with educational issues in their entirety and historicity and, at the same time, a guiding framework for educational action." In agreement with this definition, Saviani (2005, p. 1) states that Pedagogy is a theory structured through and for educational practice. It is, therefore, the theory of education, aimed at guiding teaching and learning processes.

Pedagogy and Didactics, however, should not be understood as theory and practice, respectively. Rather, both are scientific disciplines dedicated to understanding educational phenomena in both their theoretical and practical dimensions. Pedagogy constitutes the science of educational practice, whereas Didactics is concerned with the relationships among educational objectives, curricular content, teaching methodologies, and assessment practices,

while also addressing issues such as professional identity, teaching ethics, and other aspects of educational practice (Libâneo, 2005).

Therefore, the participants' perceptions are inconsistent with the conceptual definitions presented in the educational literature. Similar findings were reported by Vagula, Nascimento, and Gasparin (2019), who investigated participants' conceptions of the concepts of education, Didactics, and Pedagogy. Their sample included individuals representing four educational levels: no formal schooling, elementary education, secondary education, and higher education. Analysis of the participants' accounts revealed several misconceptions regarding these concepts.

With respect to Didactics, some participants were unable to define the concept, whereas others described it as the use of instructional tools or resources to deliver a "good lesson." The remaining participants defined it as a way of teaching content through a particular method. Overall, most interviewees expressed the view that Didactics facilitates teaching practice by making knowledge more accessible and understandable for students.

Regarding the concept of Pedagogy, the study conducted by Vagula, Nascimento, and Gasparin (2019) reports that most participants understood it as a teacher education program. In addition to this perception, some participants associated Pedagogy with the various professional roles performed within the school setting. Only a small number of participants demonstrated an understanding consistent with the conceptualizations proposed by Libâneo (2005) and Saviani (2005), describing Pedagogy as the science of education, whose purpose is to investigate and develop ways of educating.

These findings indicate that the concepts of Didactics and Pedagogy continue to be marked by misconceptions regarding their definitions and characteristics, both in schools and in higher education institutions. A key distinction between the study conducted by Vagula, Nascimento, and Gasparin (2019) and the present investigation is that the participants in the former were predominantly individuals with no formal background in teacher education. In contrast, the participants in this study are undergraduate students preparing to become teachers. This finding raises an important concern: Are future teachers developing an appropriate understanding of the pedagogical knowledge required for professional teaching practice?

This discussion leads us back to the question: What constitutes a "didactic lesson"? Based on the perceptions that emerged from the data, we found that the participants tend to use didactic as an adjective to describe what they consider to be a good lesson, while simultaneously confusing this concept with Pedagogy or Teaching Methodology (TM). Furthermore, they perceive student indiscipline as an obstacle to delivering a "more didactic lesson." These findings are consistent with Mesquita's (2020) argument that the concept of Didactics may function either as a noun or as an adjective. Nevertheless, according to the

participants' accounts, what they describe as a didactic lesson is more accurately characterized as a dynamic lesson, involving the use of a variety of instructional tools and teaching strategies.

What, then, is a didactic lesson? Is this expression conceptually coherent? If Didactics is understood as a branch of Pedagogy and, therefore, as a field of knowledge, every lesson is necessarily grounded in educational theories and Pedagogical Trends. Consequently, it would not be possible to conceive of a lesson that is non-didactic or without Didactics. Rather, this apparent conceptual confusion seems to stem from whether teachers make effective—or ineffective—use of instructional strategies that best support students' learning of particular curricular content.

Final Considerations

The present study sought to understand how pre-service Biology teachers perceive concepts that are fundamental to teaching practice. Based on the analysis of internship reports and semi-structured interviews, the findings reveal that the participants experience difficulties in explaining concepts related to pedagogical knowledge, particularly Didactics and Pedagogical Trends (PTs).

The participants generally confuse Pedagogical Trends with Teaching Methodology (TM) or with teaching strategies. They do not recognize that teaching practice is fundamentally guided by Pedagogical Trends, nor do they understand that the organization of classroom instruction and methodological choices are shaped by the theoretical perspectives upon which teachers base their practice. With regard to Didactics, the term is commonly used as an adjective to describe what participants perceive as a good lesson (i.e., a didactic lesson), in contrast to what they identify as traditional teaching. Although this usage is not necessarily incorrect, it reflects a limited understanding of Didactics, failing to recognize it as an academic field of inquiry.

The findings indicate that the participants' understanding of these pedagogical concepts remains fragmented and incomplete, highlighting the need for these concepts to be addressed more explicitly throughout initial teacher education. A clearer conceptual understanding may contribute to a more rigorous and reflective professional practice. Given that the participants are still progressing through their undergraduate education, these concepts can undoubtedly be further developed during their teacher preparation. We therefore consider it important to continue following these participants in future studies in order to examine the conceptual changes that accompany their academic and professional development.

Given the limited number of participants, the findings should not be generalized beyond the context of the study—nor was such generalization ever intended. Nevertheless, we believe that the analyses and discussions presented here make a meaningful contribution to the field of Science Education, particularly because the findings highlight the need for a more

effective integration of content knowledge and pedagogical knowledge, suggesting that this remains an important gap in initial teacher education. This represents the principal contribution of the present study.

Funding

This study was supported by the Coordenação de Aperfeiçoamento de Pessoal de Nível Superior – Brasil (CAPES) under Finance Code 001.

REFERENCES

- Arrigo, V. (2021). *O conhecimento pedagógico do conteúdo de uma licencianda em química: Implicações para o desenvolvimento profissional docente* [Tese de doutorado, Universidade Estadual de Londrina].
- Becker, F. (2001). *Modelos pedagógicos e modelos epistemológicos*. Artmed.
- Behrens, M. A. (2009). *O paradigma emergente e a prática pedagógica* (3ª ed.). Vozes.
- Bogdan, R., & Biklen, S. (1994). *Investigação qualitativa em educação: Uma introdução à teoria e aos métodos*. Porto Editora.
- Candau, V. M. (Org.). (1983). *A didática em questão* (5ª ed.). Vozes.
- Cibotto, R. A. G., & Oliveira, R. M. M. A. (2017). TPACK–Conhecimento tecnológico e pedagógico do conteúdo: Uma revisão teórica. *Imagens da Educação*, 7(2), 11–23.
- Farias, I. M. S. D., Sales, J. D. O. C. B., Braga, M. M. S. D. C., & França, M. D. S. L. M. (2009). *Didática e docência: Aprendendo a profissão*. Liver Livros.
- Fonseca, J. J. S., & Fonseca, S. (2016). *Didática geral* (1ª ed.) [E-book]. Inta.
<https://md.uninta.edu.br/geral/didatica/pdf/Did%C3%A1tica%20Geral.pdf>
- Fernandez, C. (2015). Revisitando a base de conhecimentos e o conhecimento pedagógico do conteúdo (PCK) de professores de ciências. *Ensaio: Pesquisa em Educação em Ciências*, 17(2), 500–528. <https://doi.org/10.1590/1983-21172015170211>
- Krasilchik, M. (2019). *Prática de ensino de biologia* (4ª ed.). Edusp.
- Libâneo, J. C. (2012). A persistente dissociação entre o conhecimento pedagógico e o conhecimento disciplinar na formação de professores: Problemas e perspectivas. *Anais da 35ª Reunião Anual da ANPED*. ANPED.
- Libâneo, J. C. (1994). *Didática*. Cortez.
- Libâneo, J. C. (2005). *Pedagogia e pedagogos, para quê?* (8ª ed.). Cortez.
- Manfredi, S. M. (1993). *Metodologia de ensino: Diferentes concepções*. F. E. Unicamp.
- Mazon, M. J. S. (2012). *TPACK (conhecimento pedagógico de conteúdo tecnológico): Relação com as diferentes gerações de professores de matemática* [Dissertação de mestrado, Universidade Estadual Paulista Júlio de Mesquita Filho].
- Mesquita, S. S. A. (2020). Elementos da didática para a juventude: Entre a dimensão relacional e a construção de sentidos. *Revista Portuguesa de Educação*, 33(2), 200–225.
<https://revistas.rcaap.pt/rpe/article/view/15755>

- Mishra, P., & Koehler, M. J. (2006). Technological pedagogical content knowledge: A framework for teacher knowledge. *Teachers College Record*, 108(6), 1017–1054.
<https://psycnet.apa.org/record/2006-07285-002>
- Mizukami, M. G. N. (1986). *Ensino: As abordagens do processo*. EPU.
- Mizukami, M. G. N. (2004). Aprendizagem da docência: Algumas contribuições de L. S. Shulman. *Educação (UFSM)*, 29(2), 33–50.
- Moraes, R., & Galiazzi, M. C. (2016). *Análise textual discursiva* (3ª ed.). Unijuí.
- Moraes, R., & Galiazzi, M. C. (2006). Análise textual discursiva: Processo reconstrutivo de múltiplas faces. *Ciência & Educação*, 12(1), 117–128.
<https://www.scielo.br/j/ciedu/a/wvLhSxkz3JRgv3mcXHBWSXB/abstract/?lang=pt>
- Paz, M. S. P. (2024). *Metodologias de ensino e seus desdobramentos: Percepção de professores em formação inicial em ciências biológicas* [Dissertação de mestrado, Universidade Estadual do Oeste do Paraná].
- Saviani, D. (2005). *As concepções pedagógicas na história da educação brasileira*.
https://histedbrantigo.fe.unicamp.br/navegando/artigos_pdf/Dermeval_Saviani_artigo.pdf
- Shing, C. L., Saat, R. M., & Loke, S. H. (2015). The knowledge of teaching—Pedagogical content knowledge (PCK). *Malaysian Online Journal of Educational Sciences*, 3(3), 40–55.
<https://eric.ed.gov/?id=EJ1085915>
- Shulman, L. S. (1987). Knowledge and teaching: Foundations of the new reform. *Harvard Educational Review*, 57(1), 1–22. <http://hepgjournals.org/doi/pdf/10.17763/haer.57.1.j463w79r56455411>
- Vagula, E., Gasparin, J. L., & Nascimento, M. C. M. (2019). Educação, didática e pedagogia: A interlocução entre o conhecimento científico e o senso comum. *Nuances: Estudos sobre Educação*, 30(1). <https://revista.fct.unesp.br/index.php/Nuances/article/view/6743/pdf>
- Zahavi, D. (2019). *Fenomenologia para iniciantes*. Via Verita.
- Zanette, M. S. (2017). Pesquisa qualitativa no contexto da educação no Brasil. *Educar em Revista*, 33(65), 149–166.
<https://www.scielo.br/j/er/a/qGBmR7D7z6DDv7zKkrndSDs/abstract/?lang=pt>