

## TEACHER COLLABORATION IN HIGHER EDUCATION: A SYSTEMATIC LITERATURE REVIEW ON PRACTICES MEDIATED BY PROJECT-BASED LEARNING

### COLABORAÇÃO DOCENTE NO ENSINO SUPERIOR: UMA REVISÃO SISTEMÁTICA DA LITERATURA SOBRE PRÁTICAS MEDIADAS PELA APRENDIZAGEM BASEADA EM PROJETOS

### COLABORACIÓN DOCENTE EN LA EDUCACIÓN SUPERIOR: UNA REVISIÓN SISTEMÁTICA DE LA LITERATURA SOBRE PRÁCTICAS MEDIADAS POR EL APRENDIZAJE BASADO EN PROYECTOS



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#### ABSTRACT

This article analyzes how teacher collaboration has been addressed in the literature on Project-Based Learning (PBL), through a Systematic Literature Review (SLR) conducted following the PRISMA protocol. The investigation was guided by the following question: how is teacher collaboration described, enabled, and limited in studies on PBL implementation in formal education settings? Searches were carried out in five national and international databases between January 2021 and May 2025, resulting in a final corpus of seven studies. Thematic analysis revealed that collaboration manifests unevenly across the domains analyzed: present in planning, partial in execution, and practically absent in assessment. The results indicate that its emergence depends on deliberate institutional conditions, such as protected time and committed pedagogical leadership, without which teacher isolation persists as the norm. The findings point to a relevant gap: the absence of empirical investigations into these conditions, particularly within Brazilian vocational and technical education.

**Keywords:** Teacher Collaboration. Project-Based Learning. Systematic Literature Review. Vocational and Technical Education. Pedagogical Practices.

#### RESUMO

Este artigo analisa como a colaboração docente tem sido abordada na literatura sobre ensino superior mediado pela Aprendizagem Baseada em Projetos (PBL), por meio de uma Revisão Sistemática da Literatura (RSL) conduzida pelo protocolo PRISMA. A investigação foi guiada pela seguinte questão: como a colaboração entre docentes é descrita, viabilizada e limitada

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nos estudos sobre implementação da PBL em contextos de educação formal? As buscas foram realizadas em cinco bases de dados nacionais e internacionais, entre janeiro de 2021 e maio de 2025, resultando em um corpus final de sete estudos. A análise temática revelou que a colaboração se manifesta de forma desigual entre os domínios analisados: presente no planejamento, parcial na execução e praticamente ausente na avaliação. Os resultados indicam que sua emergência depende de condições institucionais deliberadas, como tempo protegido e liderança pedagógica comprometida, sem as quais o isolamento docente persiste como norma. A contribuição deste trabalho é evidenciar, com base em evidências sistemáticas, que a colaboração docente constitui uma condição estruturante para a efetividade da PBL, e não uma variável secundária, o que tem implicações diretas para a formação docente e para a gestão institucional na Educação Profissional e Tecnológica (EPT) brasileira.

**Palavras-chave:** Colaboração Docente. Aprendizagem Baseada em Projetos. Revisão Sistemática da Literatura. Educação Profissional e Tecnológica. Práticas Pedagógicas.

## RESUMEN

Este artículo analiza cómo la colaboración docente ha sido abordada en la literatura sobre enseñanza mediada por el Aprendizaje Basado en Proyectos (ABP), mediante una Revisión Sistemática de la Literatura (RSL) realizada siguiendo el protocolo PRISMA. La investigación fue guiada por la siguiente pregunta: ¿cómo se describe, viabiliza y limita la colaboración entre docentes en los estudios sobre implementación del ABP en contextos de educación formal? Las búsquedas se realizaron en cinco bases de datos, entre enero de 2021 y mayo de 2025, resultando en un corpus final de siete estudios. El análisis temático reveló que la colaboración se manifiesta de forma desigual entre los dominios analizados: presente en la planificación, parcial en la ejecución y prácticamente ausente en la evaluación. Los resultados indican que su emergencia depende de condiciones institucionales deliberadas, como el tiempo protegido y el liderazgo pedagógico comprometido, sin las cuales el aislamiento docente persiste como norma.

**Palabras clave:** Colaboración Docente. Aprendizaje Basado en Proyectos. Revisión Sistemática de la Literatura. Educación Profesional y Tecnológica. Prácticas Pedagógicas.

## 1 INTRODUCTION

Project-Based Learning (*PBL*) is one of the most discussed pedagogical approaches in the literature on professional and technological training. Inspired by the pedagogy of John Dewey (1936), it organizes knowledge around authentic and contextualized situations, resignifying the role of the teacher as a mediator of the learning process (Bender, 2014; Barbosa; Moura, 2013). In project-based teaching, the student assumes a central role in the construction of knowledge, while the teacher coordinates and integrates knowledge from different fields. However, the successful implementation of PBL depends on a condition that the literature describes as often absent in institutions: collaboration between teachers.

In this context, the role of the teacher shifts from a transmitter of content to a mediator of the learning process, as discussed by Pimenta and Anastasiou (2014), which requires new forms of professional action, including collaborative work. Teacher collaboration presupposes joint planning, co-responsibility and collective reflection on practice (Fiorentini, 2004). These practices face persistent structural obstacles: work overload, curricular fragmentation, lack of institutionalized time for collective work, and a pedagogical culture that historically values isolation (Hargreaves, 1998; Masson, 2009).

In the context of Brazilian Professional and Technological Education (EFA), this tension is particularly evident. The National Curriculum Guidelines demand interdisciplinary practices while the organizational structures of the institutions rarely create conditions to make them effective (Saviani, 2003; Frigotto, 2007). This article starts from the premise that teacher collaboration is not a prerequisite that can be simply demanded, but an emergent property of an intentionally cultivated system (Thomas; Brown, 2011). This perspective shifts the focus from the individual goodwill of teachers to the institutional conditions that make collaboration possible and sustainable.

The objective of this paper is to analyze how teacher collaboration has been approached in the literature on higher education mediated by PBL, through a Systematic Literature Review (RSL) guided by the PRISMA protocol, identifying: (a) the domains in which collaboration manifests itself; (b) the enablers and recurrent barriers; and (c) the empirical gaps that require investigation, especially in the context of Brazilian EFA.

## 2 THEORETICAL FRAMEWORK

To understand how teacher collaboration emerges in PBL contexts, it is necessary to articulate three conceptual axes: the logic of learning ecosystems, which provides the systemic framework; project pedagogy, which defines the context of practice; and the literature on teacher collaboration, which delimits the object of investigation. These three axes

are not independent: collaboration can only be understood as an educational phenomenon when one considers the environment in which it occurs and the pedagogical approach that requires it.

## 2.1 CREATIVE ECOSYSTEMS AND THE LOGIC OF COMPLEXITY

The concept of learning ecosystem, based on Thomas and Brown (2011), proposes a transition from learning as the acquisition of knowledge to active participation in a living system, composed of a structured environment and a collective of people who interact. In these environments, innovation is not planned from the top down, but emerges from the relationships between participants. This perspective represents a break with transmissive models of teaching, in which the teacher operates in isolation and the curriculum works as a sequence of independent contents.

The relevance of this framework for the present study lies in the nature of the problem investigated. Morin (2005) argues that it is necessary to overcome the paradigm of disjunction and simplification, understanding the whole from the interactions between the parts. In the educational field, isolated pedagogical practices are incapable of responding to problems that are, by nature, systemic. Teacher collaboration, in this context, is not only a didactic strategy, but a condition for the learning environment to function as a coherent system. Resnick (2017) reinforces this perspective by identifying that meaningful learning occurs in mutual support networks, which is true for both students and the teachers who teach them.

The limit of this framework, however, needs to be recognized: Thomas and Brown (2011) and Resnick (2017) developed their arguments mainly in contexts of informal learning and basic education. Its transposition to technical-professional higher education requires theoretical mediation, which is provided by the following two axes.

## 2.2 PBL AS AN ORGANIZING AXIS OF PEDAGOGICAL PRACTICE

PBL organizes teaching around authentic problems that require investigation, collaboration, and the production of concrete results (Bender, 2014). Its foundation goes back to Dewey's pedagogy (1936), for whom genuine learning occurs through reflective experience and not through the passive transmission of contents. In the context of higher education, Schön (2000) complements this perspective by arguing that professional practice is inherently reflexive, which makes PBL especially suitable for professional and technological training.

There is, however, an unresolved tension in the literature: while PBL is widely recommended as an integrative approach, studies on its implementation reveal that it rarely

transforms the teaching culture spontaneously. Pimenta and Anastasiou (2014) argue that teaching in higher education requires the ability to articulate pedagogically and work in a team, but traditional teacher training does not prepare teachers for this. This contradiction is central to the present study: PBL requires collaboration, but the conditions for it to occur need to be deliberately constructed.

### 2.3 TEACHER COLLABORATION: PRACTICES, FORMS AND CONDITIONS

The literature on teacher collaboration presents consensuses and tensions that need to be made explicit. The central consensus is that genuine collaboration goes beyond the coordination of tasks: it presupposes joint planning, co-responsibility for the results and collective reflection on practice (Fiorentini, 2004). Hargreaves (1998) distinguishes four types of teaching cultures, individualism, artificial collegiality, balkanization, and genuine collaboration, arguing that most institutions operate in balkanization, in which faculty subgroups function in isolation and sometimes competitively. This distinction is relevant because it indicates that not all joint work constitutes collaboration.

The tension in literature lies in the question of conditions. Hargreaves (1998) emphasizes structural and cultural conditions, such as protected time, physical space, and committed pedagogical leadership. Tardif (2014), in turn, shifts the focus to training: teaching knowledge is built throughout the professional trajectory, and contexts that do not promote interaction between teachers produce fragmented knowledge. Imbernón (2010) articulates the two perspectives by arguing that training should occur in collective, reflexive and situated contexts, treating collaboration not only as a pedagogical strategy, but as a process of continuous professional development.

The gap identified in this literature is twofold. On the one hand, Masson (2009) demonstrates that teacher training policies in Brazil rarely prepare teachers for collective work, creating a structural distance between pedagogical demands and the competencies developed. On the other hand, the international literature on teacher collaboration in PBL, as evidenced by the RSL presented in this article, deals predominantly with the domains of planning and professional development, leaving collaboration in evaluation as a systematically neglected field. It is precisely this lacuna that justifies the research proposed here.

## 3 METHODOLOGICAL PATH

This study is a Systematic Review of the Literature with a qualitative approach and descriptive-interpretative character, guided by the PRISMA protocol (*Preferred Reporting*

*Items for Systematic Reviews and Meta-Analyses*). Adherence to this protocol ensures traceability, transparency, and replicability of findings (Fujita; Barbosa, 2020).

The investigation was guided by the following guiding question: how is collaboration between teachers described, made feasible and limited in studies on the implementation of PBL in formal education contexts? The searches were carried out between January 2021 and May 2025, in five databases: Web of Science, Scopus, SciELO, ERIC and Google Scholar. The search strategy combined descriptors from three conceptual axes: PBL, teacher collaboration, and educational context.

The inclusion criteria were:

- a) explicitly mention PBL;
- b) to address collaboration practices involving professors, not only among students;
- c) be linked to contexts of formal education.

Articles with an exclusive focus on student collaboration, purely theoretical studies without description of practices, and non-academic publications were excluded.

The selection process started from 358 records identified. After removing duplicates ( $n = 11$ ), deletion by automation ( $n = 20$ ), screening by title and abstract ( $n = 311$  excluded), and reading it in full for eligibility verification ( $n = 15$  evaluated, 8 excluded), we arrived at a final corpus of seven studies. The reasons for exclusion in the full reading were:

- a) exclusive focus on students without faculty collaboration ( $n = 4$ );
- b) PBL applied outside the formal educational context ( $n = 3$ );
- c) theoretical study without description of practices ( $n = 1$ ).

The entire screening path was systematized through the Bibliographic Records Explorer (RBS), a digital tool developed in this project to record metadata, inclusion and exclusion criteria, and justifications for each decision, ensuring traceability and auditability of the RSL (Figure 1). The RBS is available permanently at: <https://gptedcom.com.br/erb/>

**Figure 1**

*Bibliographic Records Explorer (ERB) interface*

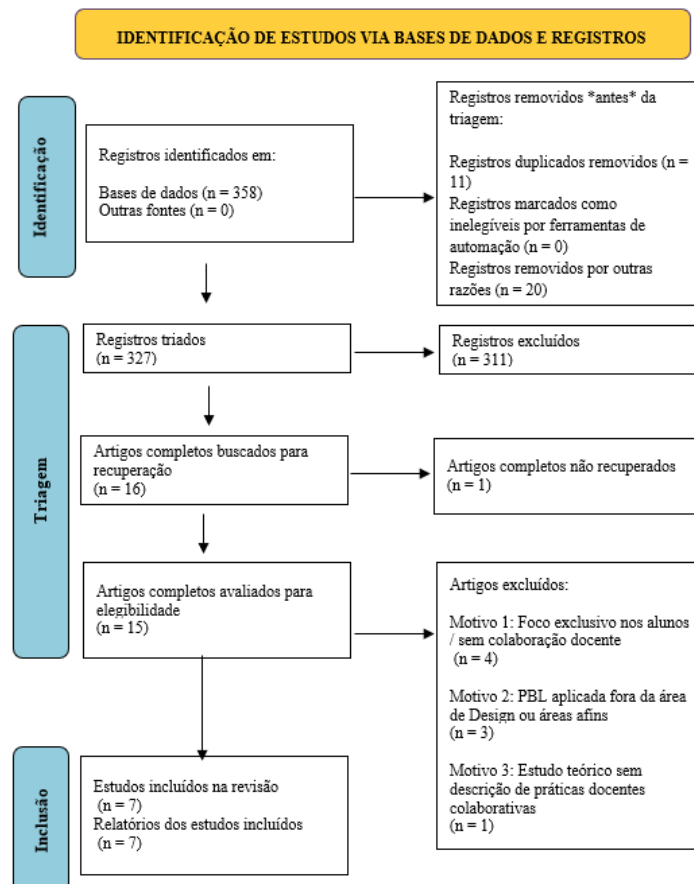


Source: Prepared by the authors.

The selection process is detailed in the PRISMA flowchart (Figure 2).

**Figure 2**

*PRISMA flowchart of the article selection process*



Source: Prepared by the authors.

### 3.1 LIMITATIONS OF THE METHODOLOGICAL APPROACH

The main limitation of this study is the relatively restricted corpus, a reflection of the incipience of specific productions on teacher collaboration in PBL. This characteristic requires caution in generalizing the results. The development of the analyses was anchored, for this reason, in research from related fields, such as Education, Engineering and Language Teaching. This transposition is simultaneously a strength, due to its interdisciplinary nature, and a limitation, because the findings have not yet been confronted with direct empirical investigations in the context of Brazilian EFA.

## 4 MAPPING OF FACULTY COLLABORATION: FINDINGS OF THE RSL

Table 1 shows the identification of the seven studies that made up the final corpus of this RSL.

**Table 1**

*Identification and Characterization of Studies Included in the RSL*

ID	Study (Author, Year)	Research Context and Focus
164	Knoblauch (2024)	Teacher training in the context of international collaboration (Germany/India) via PBL.
169	Zaafour; Salaberri Ramiro (2022)	Difficulties and solutions for the implementation of Cooperative PBL in English teaching (Spain).
202	Santos; Gupta; Petrova (2025)	Impact of pedagogical leadership and faculty collaboration on PBL curriculum implementation (Australia).
221	Dagan; Ragonis; Goldman (2023)	Implementation of an interdisciplinary STEM course via PBL in a professional master's degree (Israel, student perspective).
229	Pratiwi <i>et al.</i> (2025)	Effectiveness of the PBL model based on <i>Lesson Study</i> to improve creative thinking (Indonesia).
266	Silva (2021)	Proposition of a didactic sequence model with active methodologies for professional training (Brazil).
277	Cintra (2023)	Experiences of teachers and students with the PBL methodology in a Computer Engineering course (Brazil).

Source: Prepared by the authors.

The thematic analysis of the seven studies allowed us to map the forms, conditions and effects of teacher collaboration in PBL contexts. Chart 2 summarizes the findings by domain, identifying facilitators, barriers, and gaps.

**Table 2***Facilitators, Barriers, and Gaps of Teacher Collaboration in PBL*

Domain	Facilitators	Barriers	Gaps
Planning	Formal structures (periodic meetings); pedagogical leadership; institutional need for innovation.	Work overload; academic bureaucracy (ID 277); difficulty in curricular alignment (ID 202).	Absence of instruments for recording and evaluating collective planning processes.
Professional Development	Leadership that fosters collaborative culture; structured models such as <i>Lesson Study</i> (ID 229); international collaboration (ID 164).	Lack of specific training; cultural resistance to collective work; teacher isolation.	Scarcity of continuing education programs focused on collaboration in PBL.
Execution	Diversity of knowledge; formal structures that provide for co-presence (ID 221).	Logistical challenges (incompatible schedules); different pedagogical styles; lack of experience in shared teaching.	Few reports of systematized co-teaching; punctual and non-formalized practices predominate.
Evaluation	Highly structured methodologies that formalize the joint reflection stage (ID 229).	Absence of models and instruments for the collaborative assessment of learning.	Domain with less presence in the literature: indirect mentions predominate, without formalized instruments.

Source: Prepared by the authors.

The findings reveal that teacher collaboration manifests itself with greater frequency and structure in the domains of planning and professional development. A clear trend can be observed: the closer to the moment of evaluation, the lower the presence of collaboration. This pattern suggests that collaboration is still partially understood by the contexts studied, restricted to the preparation phase of teaching and rarely extended to the stage in which pedagogical decisions have the greatest impact on students.

The predominance of collaboration in planning indicates that this dimension is recognized as central to the implementation of PBL, but other stages of the pedagogical process remain less explored. This gap is relevant: if collaboration does not reach evaluation, the shared pedagogical cycle remains incomplete. Lack of time, work overload, and academic bureaucracy are cited as the main systemic barriers in all contexts analyzed (Heemann; Lima; Corrêa, 2010; Masson, 2009), which indicates that the problem is structural, not individual.

This finding reinforces the need for research that not only documents collaborative practices, but also analyzes the institutional conditions that make them possible and sustainable, especially in domains where the literature is more silent.

## 5 DISCUSSION

The results of this review indicate that teacher collaboration is not only a pedagogical strategy, but a structuring condition for the effective implementation of PBL. Without collaboration, PBL risks being reduced to a change of format, keeping intact the culture of isolation that fragments the curriculum and limits student learning.

The emphasis on collaboration in planning, identified in the literature, reveals a tendency to partially understand the phenomenon, often restricted to the initial phase of the pedagogical process. This limitation may be related to teacher training itself, which, according to Tardif (2014), still favors individualized practices and rarely prepares teachers for collective work. The result is that collaboration, when it exists, tends to be voluntary and informal, dependent on personal affinities between teachers, and not on institutional arrangements that sustain it.

The findings of the RSL, although derived from a predominantly international context, find a direct correspondence in the challenges of Brazilian EFA. The barriers identified, such as work overload, academic bureaucracy, and a culture of isolation (ID 277, ID 202), are particularly acute in Brazilian public institutions. The rigid departmental structure, the distribution of hours that rarely provide time for collective planning, and a tradition of teacher autonomy that is often confused with individualism create an unfavorable terrain for the emergence of sustainable collaborative practices.

This scenario reveals a relevant contradiction in relation to national curriculum policies. Although the National Curriculum Guidelines and the EFA frameworks require interdisciplinary and flexible practices (Saviani, 2003; Frigotto, 2007), such proposals often remain at the formal level, due to the lack of institutional mechanisms for their implementation. Imbernón (2010) reminds us that teacher training needs to take place in collective and situated contexts: it is not enough to prescribe interdisciplinarity if teachers are not able to practice it.

The analysis of the facilitators identified in the RSL indicates that collaboration emerges with greater consistency when there are three simultaneous conditions: protected time for collective work, pedagogical leadership committed to the collaborative culture, and structured models that formalize the processes of joint reflection. None of the studies analyzed recorded sustainable collaboration in the absence of these conditions. This finding

has direct implications for institutional managers: collaboration needs to be planned and enabled, not just encouraged.

The field of evaluation deserves special attention. None of the seven studies identified formalized models for the collaborative assessment of learning in PBL contexts. The absence of collaborative practices in this domain indicates that, even in contexts where collaboration is established in planning and execution, it does not necessarily extend to the most consequential stage of the process. This gap points to a necessary research agenda: empirical studies are required that investigate, in real EFA contexts, which institutional arrangements favor the emergence of teacher collaboration in PBL, with special attention to the domain of evaluation.

## **6 FINAL CONSIDERATIONS**

The results of this review indicate that teacher collaboration is not only a pedagogical strategy, but a structuring condition for the effectiveness of PBL in higher education. Without it, the approach risks being reduced to a change of format, keeping intact the culture of isolation that fragments the curriculum and limits student learning. RSL confirmed that collaboration emerges with greater consistency where there are formal structures that make it viable: protected time, committed leadership, and structured models of collective reflection.

The main contribution of this work is to show, through systematic mapping, that this condition is not distributed homogeneously: it is present in planning, partially in execution and almost absent in evaluation. This asymmetry is not accidental. It reflects the real conditions of teaching work in institutions where collective time is not protected and continuing education rarely addresses collaborative work.

In the context of Brazilian EFA, the findings have direct implications for teaching and institutional management. For the teachers, the results suggest that collaboration needs to be understood as a formative process in itself, not just as a condition for implementing PBL. For managers, the data indicate that it is not enough to demand interdisciplinarity: it is necessary to create the structural conditions that make collaboration – possible, including protected time, collective spaces and continued support (Imbernón, 2010; Tardif, 2014).

This study has limitations that need to be acknowledged. The corpus is restricted and most of the studies analyzed come from international contexts, which limits the direct transferability of the findings to the Brazilian reality. Empirical investigations, conducted in real EFA contexts in Brazil, are needed to confront and deepen the patterns identified in this review.

As an additional product of this RSL, the development of the RBS, a digital instrument that contributes to the management and auditability of systematic reviews, stands out. It is recommended that future studies conduct case studies in EFA institutions, employing interviews, focus groups, and document analysis, in order to empirically identify the institutional conditions that favor the emergence and sustenance of faculty collaboration in PBL contexts.

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