PIBID AND TEACHER TRAINING: KNOWLEDGE UNDER CONSTRUCTION IN MATHEMATICAL LITERACY

PIBID E FORMAÇÃO DOCENTE: SABERES EM CONSTRUÇÃO NA ALFABETIZAÇÃO MATEMÁTICA

PIBID Y FORMACIÓN DOCENTE: SABERES EN CONSTRUCCIÓN EN LA ALFABETIZACIÓN MATEMÁTICA

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ABSTRACT

This article presents a reflective analysis of a teacher education experience developed within the Programa Institucional de Bolsas de Iniciação à Docência (PIBID – Institutional Program for Teaching Initiation Scholarships), Pedagogy subproject, carried out at Escola Municipal Flávio Vilela, in the municipality of Jataí, Goiás, Brazil, from November 2024 to July 2026, with a focus on mathematical literacy processes in the early years of elementary education. The study is theoretically grounded in the contributions of Maurice Tardif, António Nóvoa, Paulo Freire, and Magda Soares, in dialogue with contemporary perspectives from Mathematics Education and mathematical literacy. A qualitative methodological approach was adopted, based on participant observation, the production of didactic materials, collective planning, and pedagogical interventions conducted with a second-grade class. The findings indicate that PIBID constitutes a privileged space for articulating theory and practice, fostering the construction of professional teaching knowledge, particularly in relation to instructional planning, pedagogical mediation, formative assessment, and collaborative work. In the field of mathematical literacy, the results highlight the consolidation of problem solving as a central methodological axis and the strengthening of the integration between language and mathematical thinking in classroom practices. The study concludes that teaching initiation experiences mediated by PIBID contribute significantly to the education of reflective, critical, and socially committed teachers, capable of developing inclusive pedagogical practices and promoting the democratization of mathematical knowledge in the early years of schooling.

Keywords: Teacher Education. PIBID. Mathematical Literacy. Problem Solving. Early Years of Elementary Education.

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RESUMO
Este artigo apresenta uma análise reflexiva da experiência de formação docente desenvolvida no âmbito do Programa Institucional de Bolsas de Iniciação à Docência (PIBID), subprojeto Pedagogia, realizada na Escola Municipal Flávio Vilela, no município de Jataí (GO), no período de novembro de 2024 a julho de 2026, com foco nos processos de alfabetização matemática nos anos iniciais do Ensino Fundamental. O estudo fundamenta-se nos aportes teóricos de Maurice Tardif, António Nóvoa, Paulo Freire e Magda Soares, articulados a referenciais da Educação Matemática e do letramento matemático. Metodologicamente, adotou-se uma abordagem qualitativa, baseada em observação participante, produção de materiais didáticos, planejamento coletivo e intervenções pedagógicas desenvolvidas junto a uma turma de 2º ano do Ensino Fundamental. Os resultados evidenciam que o PIBID se configura como espaço privilegiado de articulação entre teoria e prática, favorecendo a construção dos saberes docentes, especialmente no que se refere ao planejamento, à mediação pedagógica, à avaliação formativa e ao trabalho colaborativo. No campo da alfabetização matemática, destacam-se avanços na compreensão da resolução de problemas como eixo estruturante do letramento matemático, bem como na integração entre linguagem e pensamento matemático. Conclui-se que a iniciação à docência, mediada pelo PIBID, potencializa a formação de professores reflexivos, críticos e socialmente comprometidos, capazes de promover práticas pedagógicas inclusivas e de contribuir para a democratização do conhecimento matemático nos anos iniciais.

Palavras-chave: Formação de Professores. PIBID. Alfabetização Matemática. Letramento Matemático. Anos Iniciais.

RESUMEN
Este artículo presenta un análisis reflexivo de una experiencia de formación docente desarrollada en el marco del Programa Institucional de Bolsas de Iniciação à Docência (PIBID – Programa Institucional de Becas de Iniciación a la Docencia), subproyecto de Pedagogía, realizada en la Escola Municipal Flávio Vilela, en el municipio de Jataí, estado de Goiás, Brasil, en el período comprendido entre noviembre de 2024 y julio de 2026, con énfasis en los procesos de alfabetización matemática en los primeros años de la educación primaria. El estudio se sustenta teóricamente en los aportes de Maurice Tardif, António Nóvoa, Paulo Freire y Magda Soares, en diálogo con referentes de la Educación Matemática y del letramiento matemático. Metodológicamente, se adoptó un enfoque cualitativo, basado en la observación participante, la elaboración de materiales didácticos, la planificación colectiva y la realización de intervenciones pedagógicas en una clase de segundo grado de la educación primaria. Los resultados evidencian que el PIBID se configura como un espacio privilegiado para la articulación entre teoría y práctica, favoreciendo la construcción de los saberes docentes, especialmente en lo que se refiere a la planificación pedagógica, la mediación didáctica, la evaluación formativa y el trabajo colaborativo. En el ámbito de la alfabetización matemática, se destacan la consolidación de la resolución de problemas como eje metodológico central y el fortalecimiento de la integración entre lenguaje y pensamiento matemático en las prácticas de aula. Se concluye que las experiencias de iniciación a la docencia mediadas por el PIBID contribuyen de manera significativa a la formación de profesores reflexivos, críticos y socialmente comprometidos, capaces de desarrollar prácticas pedagógicas inclusivas y de promover la democratización del conocimiento matemático en los primeros años de escolarización.

Palabras clave: Formación Docente. PIBID. Alfabetización Matemática. Resolución de Problemas. Primeros Años de la Educación Primaria.

1 INTRODUCTION

The initial training of teachers is a field of debates and investigations in the educational area, especially with regard to the articulation between the theoretical knowledge developed in the university and the pedagogical practices experienced in the school routine. In this context, the Institutional Program for Teaching Initiation Scholarships (PIBID), created in 2007 by the Coordination for the Improvement of Higher Education Personnel (CAPES), emerges as a strategic public policy to qualify the training of future teachers.

PIBID seeks to promote the insertion of undergraduates in the daily life of public schools, providing them with opportunities to create and participate in methodological, technological and teaching practices of an innovative and interdisciplinary nature, which seek to overcome problems identified in the teaching-learning process (BRASIL, 2013). In this way, the program allows undergraduate students to experience the school reality during their initial training, contributing to a more contextualized and meaningful training.

This article presents a reflective analysis of the experience of participation in PIBID developed in a school in the southwest of the State of Goiás, from November 2024 to January 2026, in a Subproject of the Pedagogy Course of a federal university. The work focused on mathematical literacy in the early years of Elementary School, in a 2nd grade class of the morning period for the recomposition of learning.

The objective of this text is to analyze the contributions of PIBID to the construction of teaching knowledge necessary for pedagogical practice in mathematical literacy, as well as to reflect on the multiple dimensions of teacher training experienced during the program. To this end, a qualitative approach was adopted, based on participant observation, production of didactic materials, pedagogical interventions and reflective records of the activities developed. The relevance of this study is justified by the need to understand how teaching initiation programs contribute to the formation of reflective, critical teachers committed to quality education. In addition, it intends to contribute to the debate on mathematical literacy in the early years, a central theme for the guarantee of the right to education and for the integral development of students.

This article is structured in six sections and this introduction. The second section presents the theoretical framework that underlies the research, addressing concepts about teacher training, teaching knowledge and mathematical literacy. The third section describes the methodology used in the study. The fourth section characterizes the institutional context of the participating school. The fifth section presents and analyzes the activities developed and the results obtained. Finally, the sixth section brings the final considerations, synthesizing the main contributions of PIBID to teacher training.

2 TEACHER TRAINING AND PROFESSIONAL KNOWLEDGE

Teacher training is a continuous process that begins in initial training and extends throughout the professional career. According to Tardif (2014), teaching knowledge is plural, heterogeneous and temporal, constituting itself from several sources: knowledge from professional training (from educational sciences and pedagogical ideology), disciplinary knowledge, curricular knowledge and experiential knowledge. It is in the articulation of these different types of knowledge that the teacher builds his professional identity and develops his pedagogical practice.

Nóvoa (2017) emphasizes the importance of establishing one's position as a teacher and affirming the teaching profession, highlighting that training must go beyond the acquisition of technical knowledge, also involving the development of a reflective, critical and ethical posture. The author argues that teacher training should be anchored in three fundamental axes: knowledge (mastery of specific knowledge), professional culture (insertion in the profession) and pedagogical tact (ability to act in complex and unpredictable situations).

The perspective of reflective education, developed by Schön (1992), proposes that teachers be trained as reflective professionals, capable of reflecting on their own practice, critically analyzing their actions and making reasoned decisions. This approach values practical knowledge and the ability to learn from experience, recognizing that professional practice involves complex situations that require more than the application of pre-established theories.

Freire (1996) presents important contributions to thinking about teacher training from a critical and emancipatory perspective. The author highlights that teaching requires critical reflection on practice, recognition and assumption of cultural identity, respect for the autonomy of the student, humility, tolerance and conscious decision-making. For Freire, the permanent training of teachers should be centered on critical reflection on practice, because it is by thinking critically about the practice of today or yesterday that the next practice can be improved.

In the Brazilian context, PIBID emerges as an innovative public policy that seeks to bring the university closer to basic school, providing undergraduates with teaching initiation experiences under the supervision of experienced teachers. This immersion in the daily school life during initial training enables the development of practical knowledge and the construction of a more solid and contextualized professional teaching identity (NÓVOA, 2019).

3 MATHEMATICAL LITERACY: THEORETICAL PERSPECTIVES

Mathematical literacy is a fundamental process for the development of logical-mathematical thinking and for the insertion of subjects in mathematical culture. According to Danyluk (2002), mathematical literacy means teaching how to read and write mathematical language, understanding its symbols, signs and meanings. It is a process that goes beyond the simple memorization of algorithms, involving the understanding of concepts, the development of logical reasoning and the ability to solve problems.

Smole and Diniz (2001) emphasize that mathematical literacy must be articulated with everyday situations, allowing children to establish relationships between mathematical knowledge and their reality. The authors highlight the importance of pedagogical practices that value problem solving, games, play, and contextualized situations as strategies to promote meaningful mathematical learning.

The National Common Curriculum Base (BNCC) establishes that, in the early years of Elementary School, students must develop skills related to the following axes of mathematics: numbers, algebra, geometry, quantities and measures, and probability and statistics (BRASIL, 2018). The document emphasizes that mathematics teaching should promote the development of mathematical literacy, defined as the competencies and abilities to reason, represent, communicate and argue mathematically.

Lorenzato (2006) highlights the importance of mathematics education in the early years, arguing that it is at this stage that the foundations for the development of mathematical thinking are established. The author emphasizes that the teacher of the early years plays a fundamental role in mathematical literacy, and must have not only mastery of mathematical content, but also specific didactic knowledge to teach mathematics to children.

Nacarato, Mengali and Passos (2009) point out that the initial training of teachers who teach mathematics in the early years often presents gaps, with future teachers arriving at university with conceptual weaknesses and negative attitudes towards mathematics. The authors argue that Pedagogy courses should provide formative experiences that allow undergraduates to reframe their relationships with mathematics, developing solid mathematical knowledge and confidence to teach.

4 METHODOLOGY

This research is characterized as a qualitative study of descriptive and reflective nature, developed in the context of participation in PIBID, subproject Pedagogy. The research adopted action research as a methodological strategy, which, according to Thiollent (2011), is a type of social research with an empirical basis that is conceived and carried out

in close association with an action or resolution of a collective problem, in which researchers and participants representing the situation or problem are involved in a cooperative or participatory way. The study was carried out based on the teaching provided by Pibid scholarship holders in a municipal school in the city of Jataí, Goiás, from November 2024 to January 2026. The school serves students in the early years of Elementary School and is characterized by being located in a peripheral region of the municipality, predominantly serving children from families in situations of socioeconomic vulnerability.

The participating group consisted of a 2nd year class of Elementary School, in the morning, composed of approximately 25 students, aged 7 to 8 years. The choice of this class was justified by the relevance of the 2nd year in the process of mathematical literacy, a time when children must consolidate fundamental numerical concepts and progressively develop autonomy in solving mathematical problems.

The methodological procedures included: (a) participant observation of the pedagogical practices developed by the teacher in charge of the class/class; (b) documentary analysis of the school's Pedagogical Political Project and teaching plans; (c) application of diagnostics to identify students' mathematical knowledge; (d) planning and execution of pedagogical interventions, including the production of teaching materials; (e) reflective records in a field diary about the experiences lived; (f) participation in planning and training meetings with the area coordinator and the supervisor; and (g) participation in academic events related to teacher training and mathematics education.

The data analysis was carried out in an interpretative way, seeking to understand the contributions of PIBID to the construction of teaching knowledge and to the development of professional skills necessary for pedagogical practice in mathematical literacy. The records in the field diary, the students' productions and the didactic materials prepared constituted important sources for the reflective analysis of the experience.

5 CHARACTERIZATION OF THE INSTITUTIONAL CONTEXT

The Municipal School, hereinafter referred to as "FV" is located in a peripheral neighborhood of the municipality of Jataí, Goiás, and serves students in the early years of Elementary School. The institution is characterized by receiving children from families in situations of socioeconomic vulnerability, many of whom face challenges related to access to material and cultural resources.

The school's Pedagogical Political Project (PPP), prepared collectively with the participation of teachers, managers, employees and families, is based on the principles of democratic management and is aligned with the guidelines of the Curriculum Document for

Goiás (DC-GO) and the National Common Curriculum Base (BNCC). The PPP defines the school's mission as promoting quality education, forming critical, creative, autonomous citizens committed to social transformation.

The school has basic infrastructure, including classrooms, library, computer room, sports court and cafeteria. However, it faces challenges related to the limitation of material and pedagogical resources, requiring creativity and commitment from teachers to ensure quality educational practices. The pedagogical team is composed of permanent and contracted teachers, pedagogical coordinators and managers, all committed to improving the quality of teaching.

The socioeconomic context of the families served by the school directly influences the educational process. Many children experience situations of vulnerability, with limited access to books, educational games, technologies and other cultural tools. This context requires teachers to develop pedagogical practices that are sensitive to the realities of students, valuing their prior knowledge and promoting inclusive and democratic education.

6 ACTIVITIES DEVELOPED AND ANALYSIS OF RESULTS

During the period of participation in PIBID, several pedagogical activities were developed aimed at the mathematical literacy of 2nd year students. These activities were planned considering the previous knowledge identified in the diagnostic evaluations and based on consolidated theories about the teaching of mathematics in the early years.

6.1 INITIAL DIAGNOSIS

At the beginning of the activities, diagnostic evaluations were carried out to identify the students' mathematical knowledge. Activities involving counting, numerical writing, simple problem solving, identification of geometric shapes and notions of measurement were applied. The results revealed significant heterogeneity in the class, with students presenting different levels of development of mathematical thinking.

Approximately 35% of the students had difficulties in numerical writing and in understanding the decimal numeral system, confusing the order of the digits or not understanding the place value. About 40% demonstrated partial mastery, being able to perform simple operations, but presenting difficulties in problem situations that required interpretation. The remaining 25% already demonstrated greater autonomy, solving problems appropriate to the school year.

6.2 PRODUCTION OF TEACHING MATERIALS

One of the most significant aspects of the experience at PIBID was the opportunity to produce contextualized teaching materials appropriate to the different levels of mathematical understanding of students. Pedagogical games, manipulable materials, activity sheets, problem notebooks and various visual resources were elaborated.

Among the materials produced, the following stand out: (a) number track games to work on counting and numerical sequence; (b) gold material adapted with recyclable materials to work with decimal numbering system; (c) mathematical domino games involving addition and subtraction operations; (d) illustrated problem sheets contextualized in the students' reality; (e) material for the construction of geometric notions (tangram, geometric solids); (f) games involving non-standard and standardized measures; and (g) calendars and clocks to work on temporal notions.

The production of these materials required theoretical study on mathematics education, creativity, planning and collaborative work. This experience contributed to the understanding that the teacher needs to be a producer of knowledge and not just an executor of ready-made proposals, developing autonomy and criticality in relation to the available materials.

6.3 PEDAGOGICAL PRACTICES IN MATHEMATICAL LITERACY

The pedagogical interventions were planned considering the principles of problem solving, contextualization, the use of manipulable materials and the valorization of students' previous knowledge. Systematic activities were developed involving the different axes of mathematics: numbers and operations, geometry, quantities and measurements, and information processing.

In the numbers and operations axis, concepts of decimal numbering system, composition and decomposition of numbers, numerical sequence, comparison of quantities, addition and subtraction with different meanings (join, add, remove, compare) were worked on. Diversified strategies were used, including oral counting, use of concrete material, recording of operations, mathematical games and solving of contextualized problems.

In the geometry axis, activities were developed to identify and classify plane and spatial geometric shapes, explore the properties of the figures, spatial location and notions of symmetry. Manipulable materials, folding, constructions with sticks and playdough, and exploration of shapes in the environment were used.

In the quantities and measures axis, we worked with measures of time (calendar, clock, duration of events), length (non-standard and standardized measures), capacity and

mass. The activities were contextualized in situations of the children's daily life, such as measuring objects in the room, comparing heights, checking the time of activities.

6.4 PROBLEM SOLVING AS AN AXIS OF MATHEMATICAL LITERACY

Problem solving was the methodological axis of the pedagogical interventions developed, being understood not as a mere application of previously taught procedures, but as a practice that favors the construction of mathematical concepts through reflection, investigation and the mobilization of different cognitive strategies by students. From this perspective, problem solving plays a central role in the development of mathematical literacy, understood as the ability to use knowledge, procedures and mathematical languages to interpret, represent, communicate and solve situations arising from school and social daily life (Galvão; Nacarato, 2013; Brazil, 2018).

The problems elaborated in the pedagogical activities were contextualized in the students' reality, contemplating situations linked to the school and family environment and different additive and subtractive structures. Such a approach is based on the understanding that significant situations favor the attribution of meaning to mathematical concepts and contribute to children recognizing Mathematics as an instrument to understand and intervene in their social context (Galvão; Nacarato, 2013).

During the interventions, it was observed that a significant part of the students presented difficulties that went beyond the operative procedures, manifesting themselves, above all, in the reading and interpretation of the problem-situations and in the identification of the relationships between the data and the question formulated. This finding shows that, in the early years of Elementary School, the teaching of Mathematics demands the systematic articulation between language and mathematical thinking, since understanding a problem implies interpreting texts, selecting relevant information, establishing relationships and planning resolution strategies (Smole; Diniz, 2001; Galvão; Nacarato, 2013). In this sense, the development of mathematical literacy necessarily involves practices that integrate reading, writing, orality, and argumentation in working with problems (Brasil, 2018).

In view of this scenario, didactic strategies were proposed aimed at expanding the understanding of problem situations and the construction of meanings, such as: collective reading of the statements, explicit identification of the data and the question, representation of the situations through drawings and concrete materials, discussion and comparison of different resolution procedures, socialization of the strategies used by the peers and production of problems by the children themselves. Such practices value the students' reasoning, promote the explicitness of ideas and shift the focus from the correct answer to

the analysis of the thought processes mobilized in the resolution, favoring the construction of intellectual autonomy (Smole; Diniz, 2001).

The reflections produced throughout the experiences within the scope of the Institutional Scholarship Program for Initiation to Teaching (PIBID) corroborate these analyses. As recorded in the final report, the students' difficulties in solving problems were strongly related to the fragility in reading and understanding the statements, requiring systematic mediation from the teacher, especially in evaluative situations and in activities that required interpretation and decision-making (Lima, 2025). It was also observed that many students showed insecurity and fear of making mistakes, which reinforces the importance of interventions that respect the different learning rhythms, without compromising autonomy, contributing to the construction of confidence and the development of mathematical reasoning (Lima, 2025).

The report also points out that the integration between linguistic literacy and mathematical literacy, through playful activities, games, reading texts with problem situations, and the use of concrete materials, favored significant advances in problem solving, while strengthening students' orality, interaction, and participation in class (Lima, 2025). In addition, collective planning, pedagogical meetings and the production of didactic materials aimed at the recomposition of learning proved to be fundamental for the organization of proposals centered on literacy and mathematical literacy, with an emphasis on reading fluency in problem solving, especially in classes with learning gaps (Lima, 2025).

This formative experience dialogues with the understanding that teaching is built on the articulation between reflection and action, requiring constant re-elaboration of pedagogical practices, as defended by Paulo Freire (1996). Thus, the systematic work with problem solving, articulated with the perspective of mathematical literacy, proved to be a powerful way to expand conceptual understanding, strengthen argumentation and promote greater autonomy and confidence of students in the face of mathematical challenges, enabling them to recognize themselves as subjects capable of producing strategies, validating procedures and communicating mathematical ideas in different contexts.

6.5 EVALUATION AND MONITORING

Evaluation was conceived as a formative, continuous and diagnostic process, as proposed by Hoffmann (2001) and Luckesi (2011). Different evaluation instruments were used, including periodic diagnoses, observation of performance in activities, analysis of productions, records in individual files and portfolios.

The individualized monitoring of students was essential to identify advances and

difficulties, enabling specific interventions and replanning of pedagogical practices. It was observed that students who received individualized attention, especially those with greater difficulties, showed significant progress throughout the school year.

The results of the evaluations showed that most students advanced in their mathematical knowledge. Students who had initial difficulties in the decimal numeral system were able to better understand the place value. Those who already demonstrated mastery of basic concepts advanced in more complex operations and in solving challenging problems.

7 THE MULTIDIMENSIONALITY OF TEACHER TRAINING IN PIBID

The experience at PIBID made it possible to understand teacher training as a multidimensional process, which involves technical, political, ethical and aesthetic dimensions. This expanded understanding of teaching was fundamental for the construction of a solid professional identity and for the exercise of the profession with autonomy and criticality, as defended by Veiga and Silva (2012) when they highlight that teaching in higher education, and we can extend it to other levels of education, is characterized by relationships between individuals who teach, learn, research and evaluate, practices linked to broader sociocultural contexts.

The multidimensionality experienced here dialogues directly with the perspective presented by Rivas and Silva (2017, p.10), who emphasize the need to configure teaching "as a space for connecting knowledge, subjectivities and cultures, which requires highly specialized scientific, technological or artistic content oriented towards the training of critical, ethical and socially inserted professionals". In the context of PIBID, this multidimensionality gains specific contours, articulating initial training, pedagogical practice and social commitment.

The *technical dimension* refers to the mastery of the specific knowledge of the teaching profession, including mathematical knowledge, knowledge about mathematics didactics, teaching methodologies, evaluation strategies and classroom management. During the participation in PIBID, it was possible to develop essential technical skills, such as the preparation of lesson plans, selection and production of teaching materials, application of different methodological strategies and use of assessment instruments.

This technical dimension is in line with what Oliveira-Mendes and Leite (2024, p.8) identify in Brazilian curriculum policies as necessary for quality mathematical literacy. The authors point out that the BNCC (2018), despite its contradictions, "emphasizes the explicit teaching of the code, not the alphabetic writing system", which, transposed to mathematical

literacy, means working not only with mechanical procedures, but with the understanding of the decimal numbering system and mathematical operations.

The direct contact with the pedagogical practice allowed us to understand that the technical domain is not limited to the mechanical application of techniques, but involves the ability to make informed decisions, adapt strategies to the needs of students and critically evaluate the results of interventions. This critical reflection on practice is supported by Rivas and Silva (2017), when they state that "literacy through literacy" (Soares, 2020, p.4) demands "different pedagogical strategies and mediations carried out by teachers in the use of their power of agency".

The experience showed the importance of solid mathematical and didactic knowledge to teach mathematics with quality in the early years. As the VSL scholarship holder pointed out in her report on participation in the program, "(...) it is essential to start from common sense, from the students' previous knowledge and from the context in which the object of study is carried out" (PIBID Report, 2025, p. 17), establishing bridges between everyday knowledge and mathematical scientific knowledge.

The *political dimension* of teaching concerns the understanding of education as a social and political practice, committed to the transformation of reality and the construction of a more just and democratic society. During the experience at PIBID, it was possible to perceive how pedagogical practices reflect conceptions of education, mathematics and human beings.

Oliveira-Mendes and Leite (2024) warn of the historical-epistemological-didactic blackout present in recent curricular policies, highlighting that "the university has been undergoing transformations and adapting its functions according to the requirements of what the university is capable of offering for economic and scientific development" (p. 2). This market logic has also impacted basic education, reducing mathematical literacy to minimum measurable competencies, disregarding its broader formative role.

Working in a public school, serving children in vulnerable situations, required the understanding that the teacher has a social commitment to the democratization of access to mathematical knowledge and the promotion of equity. As the authors point out, 54.73% of Brazilian students in the 3rd year remained at insufficient levels of reading, according to the 2016 ANA (Brasil, 2018), indicating that school failure is not natural, but the result of political and pedagogical choices.

Mathematical literacy is the right of all children and is an essential tool for the exercise of citizenship and for the critical understanding of reality. The National Literacy Policy (PNA), as analyzed by Oliveira-Mendes and Leite (2024, p.7), represents a "clear setback" by

reducing the literacy process from three to one year, imposing "in an arbitrary way, the phonic method, which breaks with what we have been advocating for approximately four decades in the field of literacy in Brazil". This imposition disregards the contributions of the psychogenesis of writing and the specificities of mathematical literacy.

The *ethical dimension* refers to the values, principles and commitments that guide the teacher's professional performance. During the participation in PIBID, ethical issues were present in several situations: respect for the dignity and uniqueness of each student, care for the self-esteem of children (especially those with difficulties in mathematics), commitment to the planning and execution of activities, and the establishment of respectful relationships.

Veiga and Silva (2012) highlight among the principles that guide pedagogical innovations: "affectivity; autonomy; participation; contextualization; dialogicity; dynamism; diversity; ethics; equality; comprehensiveness; playfulness; reflexivity/creativity and transience" (p. 33). These principles underpin a teaching practice committed not only to the transmission of content, but to the integral formation of students.

The experience in the classroom allowed us to understand that the teacher performs a social function of great responsibility, influencing the formation of children's values and attitudes in relation to mathematics. It is essential to combat negative beliefs about mathematics (such as the idea that it is difficult or that some people do not have the ability) and to promote a positive relationship with mathematical knowledge.

The pibidian report evidences this ethical concern by describing planned activities "seeking to transform them, the knowledge of common sense, configuring them with the contributions of science" (PIBID Report, p. 50), respecting the children's previous knowledge while promoting their expansion and systematization. Rivas and Silva (2017, p.10) complement this reflection by stating that "the teaching and learning processes that occur at the university are related to the values defended by scientific fields", and that these values of rigor, intellectual honesty, respect for diversity should permeate all teacher training.

The *aesthetic dimension* of teaching is related to sensitivity, creativity and the ability to promote meaningful and pleasurable learning experiences. During PIBID, the aesthetic dimension was manifested in the production of attractive and playful teaching materials, in the organization of stimulating learning spaces, and in the care with the quality of the experiences provided to children.

Although not explicitly mentioned in the texts of Veiga e Silva (2012, p.33) and Oliveira-Mendes and Leite (2024), the aesthetic dimension permeates the founding relationships identified by the authors: "movement-affectivity; time-space". The aesthetics of the classroom, the playfulness of the materials, the harmonious organization of the

pedagogical space-time are fundamental elements for the creation of a favorable environment for mathematical learning.

The work with mathematical games, for example, was developed with aesthetic concern, creating colorful, attractive materials that are appropriate to the children's interests. This attention to the sensitive aspect of learning is supported by the scholarship holder's report when she describes the use of "games and projects" as pedagogical resources that articulate cognitive and affective dimensions (PIBID Report, p. 28).

The understanding of the aesthetic dimension contributed to a broader view of teaching, valuing mathematics education as a full human experience, which involves reason, emotion, imagination and sensitivity. Rivas and Silva (2017, p.7) reinforce this perspective by highlighting that "the cognitive, affective and psychomotor dimensions are worked on in a complementary way", overcoming false dichotomies between thinking and feeling, between knowing and creating.

The experience at PIBID made it possible to understand teacher training as a multidimensional process, which involves technical, political, ethical and aesthetic dimensions. This expanded understanding of teaching is fundamental for the construction of a solid professional identity and for the exercise of the profession with autonomy and criticality.

8 FINAL CONSIDERATIONS

Participation in the Institutional Program of Scholarships for Initiation to Teaching (PIBID) represented a formative experience of great relevance for the construction of the teacher's professional identity and for the development of knowledge and skills essential to the exercise of teaching in the early years of Elementary School, especially in the field of mathematical literacy.

The results of this research show that PIBID is a privileged space for articulation between theory and practice, enabling licentiate students to experience the school daily life in a monitored, reflective and theoretically grounded way. Insertion in basic school allows the development of a more contextualized, critical education committed to the Brazilian educational reality.

In the specific field of mathematical literacy, participation in the program allowed us to understand the complexity of the teaching-learning process of mathematics and the need for a solid theoretical foundation for the development of effective pedagogical practices. The study of theories of mathematics education was fundamental for the planning and execution of successful interventions.

The production of didactic materials proved to be an important training strategy, requiring study, creativity, planning and collaborative work. This experience contributed to the development of teacher autonomy and to the understanding that teachers need to be producers of knowledge, capable of creating resources appropriate to the specific needs of their students.

The understanding of the multidimensionality of the teaching work was one of the main lessons provided by the PIBID. The experience in the classroom made it possible to realize that teaching is not reduced to the technical dimension, but also involves political, ethical and aesthetic dimensions, all equally important for a competent and committed professional performance. The challenges faced during the experience, such as the heterogeneity of the students' mathematical knowledge, learning difficulties, limitations of material resources and the complexities of classroom management, contributed to the development of resilience, creativity and problem-solving skills, essential skills for the exercise of the teaching profession.

The collaborative work between scholarship holders, supervising professor and area coordinator proved to be fundamental for professional development. The moments of joint planning, study meetings, exchanges of experiences and shared reflections enriched the training and demonstrated the importance of collaboration in the teaching profession.

It is noteworthy that teacher training does not end with the completion of the degree or with participation in programs such as PIBID, but is a permanent process of professional development. The experience in the program made it possible to build solid foundations for professional practice, but also aroused awareness of the need for continuous training and commitment to critical reflection on practice.

It is hoped that this work will contribute to the debate on teacher training in Brazil and on the importance of public policies that value the articulation between university and basic school. The strengthening of programs such as PIBID is fundamental for the qualification of teacher training and, consequently, for the improvement of the quality of mathematics education in the early years.

It is concluded that PIBID plays a strategic role in the training of reflective, critical, technically competent and ethically committed teachers with a democratic, inclusive and quality mathematics education, contributing to the affirmation of teaching as an intellectual profession and to the construction of a truly transformative education.

9 AI STATEMENT AND AI-ASSISTED TECHNOLOGIES IN THE WRITING PROCESS

During the preparation of this work, the authors used Claude 3.5 Sonnet from Anthropic in January 2026 to assist in structuring the academic text, grammar review, formatting bibliographic references, and improving the clarity of the essay. After using this tool, the authors have reviewed and edited the content in accordance with the scientific method and assume full responsibility for the content of the publication.

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