EMP Educação Matemática Pesquisa
ISSN 1983-3156
Qualis A1
http://dx.doi.org/10.23925/1983-3156.2023v25i1p408-429

Academic-professional education and teacher professional development: A shared space?

A formação acadêmica-profissional e o desenvolvimento profissional docente: Um espaço comum?

Formación académico-profesional y desarrollo profesional docente: ¿Un espacio común?

Formation academique-professionnelle et developpement professionnel des enseignants : Un espace commun ?

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Abstract

This investigation intends to discuss and understand some objectives of the professional development of teachers who teach mathematics in an academic-professional environment through a formative action based on a conversation circle involving undergraduate students, the teaching practice supervisor, and basic education teachers. The research is characterized as a qualitative study, and the research corpus is composed of audio record transcripts and the logbook notes of the research professor. The data produced were analyzed according to the

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principles of discursive textual analysis, and the discussion was anchored in the objectives proposed by Sowder. The results point to the need to rethink the way formative actions are being developed and to possibilities of planning new actions that seek the professional development of the mathematics teacher, focused on their interests, needs, challenges, possibilities, and limitations.

Keywords: Teacher education, Teacher professional development, Supervised teaching practice.

Resumo

Este trabalho pretende discutir e compreender alguns objetivos do desenvolvimento profissional de professores que ensinam Matemática em um ambiente acadêmico-profissional, por meio de uma ação formativa do tipo roda de conversa, envolvendo estudantes da graduação, professor orientador de estágio e professores da Educação Básica. A pesquisa se caracterizou como estudo qualitativo sendo o corpus da pesquisa gravações e transcrições de áudio e diário de bordo do professor pesquisador. Os dados produzidos foram analisados seguindo os princípios da Análise Textual Discursiva, e as discussões ancoradas nos objetivos propostos por Sowder. Os resultados apontam para a necessidade de repensar o modo como as ações formativas vem sendo desenvolvidas, e para possibilidades de planejar novas ações que busquem o Desenvolvimento Profissional do Professor de Matemática, focado nos seus interesses, necessidades, desafios, possibilidades e limitações.

Palavras-chave: Formação de Professores, Desenvolvimento Profissional Docente, Estágio Supervisionado.

Resumen

Este trabajo pretende discutir algunos objetivos del desarrollo profesional de profesores que enseñan matemáticas en un ambiente académico-profesional, enfocando nuestros esfuerzos en una acción formativa involucrando estudiantes de pregrado, un supervisor de prácticas y profesores de educación Básica a partir de un círculo de conversación. La investigación se caracterizó por un estudio cualitativo y el corpus de investigación estuvo compuesto por transcripciones de audio y notas en un cuaderno de bitácora, que luego fueron analizadas de acuerdo con los principios del análisis discursivo textual. De esta forma, nuestros esfuerzos se enfocan en comprender cómo una acción formativa del tipo círculo de conversación, en un contexto académico-profesional, brinda oportunidades de desarrollo profesional para académicos y profesores de primaria que enseñan matemáticas. Los resultados apuntan para la

necesidad de repensar la forma en que se desarrollan las acciones formativas y posibilidades de planificar nuevas acciones que busquen el desarrollo profesional del Profesor de Matemáticas, enfocadas en sus intereses, necesidades, desafíos, posibilidades y limitaciones.

Palabras clave: Formación Docente, Desarrollo Profesional Docente, Prácticas Supervisadas.

Résumé

Ce travail vise à discuter de certains objectifs du développement professionnel des enseignants qui enseignent les mathématiques dans un environnement académique-professionnel, en concentrant nos efforts sur une action formative impliquant des étudiants de premier cycle, un superviseur de stage et des enseignants de l'éducation de base d'un cercle de conversation. La recherche a été caractérisée par une étude qualitative et le corpus de recherche était composé de transcriptions audio et de notes dans un journal de bord, qui ont ensuite été analysées selon les principes de l'analyse textuelle discursive. Ainsi, nos efforts visent à comprendre comment une action formative de type Conversation Circle, dans un contexte académique-professionnel, offre des opportunités de développement professionnel pour les universitaires et les enseignants du primaire qui enseignent les mathématiques. Les résultats soulignent la nécessité de repenser la manière dont les actions de formation sont développées et les possibilités de planifier de nouvelles actions visant le développement professionnel du professeur de mathématiques, axées sur ses intérêts, ses besoins, ses défis, ses possibilités et ses limites.

Mots-clés : Formation des Enseignants, Développement Professionnel des Enseignants, Stage Supervisé.

Academic-professional education and teacher professional development: A shared space?

The teaching profession is a very complex activity that requires prepared professionals. However, the search for a degree course is still impregnated with many paradigms, such as considering teaching a vocation or mission. A study carried out by Gatti et al. (2019) corroborates this idea and also reveals that when many academics choose to teach, they opt for the teaching degree course, not necessarily for the teaching profession, since one choice does not necessarily imply the other.

The diversion between the course option and the actual professional desire can contribute to low quality of education and precarious working conditions, whether in terms of remuneration or professional training. Therefore, we need to think of ways to change this perception, or they can "contribute to neutralizing the growing importance that has been attributed to specialized knowledge, insofar as it seeks to rescue the world of affections more than the aspects associated with the technicalities of the profession" (Gatti et al., 2019, p. 152).

Authors such as Nóvoa (2002, 2017) and Imbernón (2016) point the way to a new paradigm so that continuing education contributes to a change in the educational system and the consequent redefinition of the teaching profession. In this sense, we understand the continuing education process for beginning and in-service teachers as one of the essential elements in teacher professional development. According to Marcelo Garcia (2009), this process more clearly marks the conception of teaching professionals, and the term "development" implies evolution and continuity, breaking with the traditional juxtaposition between initial and continuing education, covering several instances of teacher education, and contributing to the development of their professional skills through different -formal and informal- experiences.

Nóvoa (2002) conceives that the relevant formative space means no longer an isolated teacher, but inserted in a professional body and school organization, seeking theoretical-practical dialogue between university and school in a larger movement that involves the pedagogical practice.

In this scenario, this work discusses a conversation circle type of formative action in an academic-professional context, which brought together pre-service mathematics teachers, participants in the Supervised Teaching Practice in Mathematics Teaching II, teachers working in the basic teaching network and the professor-advisor of the practice, aiming to discuss and understand the possibilities and opportunities for professional development.

This activity was carried out in 2019 and sought to contribute to the construction of a reflection process in an academic-professional environment, with students from the mathematics teaching degree course at Unipampa (Universidade Federal do Pampa), Campus Itaqui-RS and basic education teachers from municipal and state schools, in an exchange of knowledge and dialogue in the format of a conversation circle.

It is by understanding that the teaching profession develops in a continuum, and it is never seen as complete, that it encompasses all of the individuals' experiences during their entire education, passing through professional practice as a place of training and production of knowledge. We believe that even before starting in the profession, teachers are aware of the teaching process, due to their school trajectory. To Tardif (2014, p. 20): "The knowledge inherited from the previous school experience is so strong that it persists through time; and university education cannot transform, much less shake it." Therefore, even before entering university, students have a prior conception of teaching and learning resulting from the pedagogical experiences they observed in their teachers (Leão, 2021).

Referring to this process of perception of knowledge about the pedagogical practices of pre-service teachers, addressing teachers in initial education, Diniz-Pereira (2008) seeks, in the term academic-professional training, to consider the schooling processes initiated before they choose a teaching career. The author criticizes the term initial education, and describes it as follows:

> [...] uncritically adopted by the specialized literature - which carries with it the idea of a preparation that starts from the entry of the prospective teacher in a teacher education program, thus ignoring very important moments and previous experiences in this formative process (Diniz-Pereira, 2008, p. 265).

However, regarding the use of the academic-professional term, Diniz-Pereira (2011) highlights some important principles for its development:

> [...] to conceive teaching as a professional activity supported by a solid repertoire of knowledge, to understand professional practice as a place for education and production of knowledge by practitioners and establish a connection between university education institutions and basic education schools" (Diniz-Pereira, 2011, p. 213).

Focused on this identification with Diniz-Pereira (2011) when referring to academic-professional education, we sought in this study to concentrate efforts on analyzing a whole set of factors encompassed by these professional education processes, at the same time that we did not lose focus on analyzing the in-service teachers. To analyze this training action, we relied on Sowder's conception (2007) pointing out objectives for the professional development of

mathematics teachers: i) Develop a shared vision for teaching and learning mathematics; ii) Develop knowledge of mathematical content; iii) Develop an understanding of how students think and learn mathematics; iv) Develop pedagogical content knowledge; v) Develop an understanding of the role of equity in school mathematics; vi) Develop a sense of self as a mathematics teacher.

Professional Development in Teacher Education

The concept of teacher professional development (TPD) seeks to understand teacher education as it develops in a continuum, that is, in an ever-ongoing practice in life and, therefore, is never finished, encompassing all teaching career stages (Diniz-Pereira, 2008; Tardif, 2014), which, in a more specific sense, distinguishes it from the concept of professional education, which, according to Fiorentini and Grecci (2013), denotes the action of forming or giving shape to something or someone and which, therefore, is seen as an outside-in education. However, as the researchers above point out, authors such as Larrosa (1999) conceive education as something the individuals themselves carry out, that is, a social vision close to that of some authors who discuss TPD, such as Bridge (1998).

Therefore, the TPD must consider all the experiences teachers undergo during their schooling, including before university, passing through professional practice as a place of education and production of knowledge. In this sense, it tends to be seen as a dynamic process, or even, as pointed out by Passos et al. (2006), a personal, permanent, continuous and inconclusive process, which goes through multiple stages and formative instances in which "(...) teachers learn and develop professionally through participation in different practices, processes and contexts, intentionally or not, that promote education or the improvement of teaching practice (Fiorentini & Crecci, 2013, p. 13).

Day (1999) understands that professional development should be dynamic and involve multiple "spontaneous learning experiences" through which teachers assume the role of agents of change and, individually or collectively, review, renew, and expand their commitment to teaching and the classroom, developing their knowledge, skills for reflection, planning, and more adequate professional practices regarding the demands of the profession and its reality.

In the same direction, Ponte and Chapman (2008) point out that professional development must be related to practices and encompass the purposes and objectives of teacher education, as well as the curriculum and materials used by teachers in training. These authors propose that the process should involve knowledge and discussions about instruments and

assessment procedures, pedagogical approaches, motives, interests, the conceptions of teachers in training, the organization of teacher education programs, the organization of educational systems and the sociocultural aspects of society. Adler et al. (2005) complement this by pointing out that teachers' beliefs, knowledge, and practices should also be considered.

There are multiple aspects surrounding the concept of TPD, which demonstrates the complexity involved in this concept. However, without neglecting this diversity of concepts, we understand that the TPD involves the development of knowledge, experiences, and reflections that drive a praxis through the confrontation between theory and practice, which begins in their experiences that precede graduation, but which must be intensified in it, and thus continue throughout teachers' professional lives.

We believe that proposals for professional development need to be explored both in academic and professional education courses and possibilities of continuing teacher education because, although broad, some authors, in a propositional way, indicate practices that they deem effective in this process. Sowder (2007) conceives that professional development should provide opportunities for teachers' professional emancipation. In this way, they can develop the knowledge, skills, and attitudes necessary for teaching, especially mathematics.

Professional development, from this perspective, also seeks to promote teachers' understanding of how students learn mathematics. On the nature of mathematics knowledge and how to teach it in a non-mechanized perspective, they aim at developing teachers' ability to make choices related to teaching strategies, planning, and organizing classes to promote and support their students.

For Sowder (2007), education, from the perspective of professional development, should be planned to meet, in the first instance, teachers' needs because, in this way, they will be able to plan situations for their students to learn. To contemplate such needs, the author points out six objectives that professional development actions must undertake to develop. Below, we discuss each of them.

Develop a shared vision for teaching and learning mathematics

To Sowder (2007), actions aimed at professional development in continuing or academic-professional education should develop their vision of teaching and learning in a shared way. According to the author, the development of this view is related to the teachers' conceptions and beliefs about how they understand the role of school mathematics and how

students learn mathematics. Coming from the social environment, he says, such beliefs need to be remodeled from new social situations that allow them to go through a systemic review.

Develop mathematical content knowledge

This objective aims to provide teachers with opportunities to learn mathematics that suits their teaching, since it should not be seen equally at all levels of education, considering that the mathematics taught in basic education has a very different objective and focus from that taught to prospective teachers. In this way, creating alternative teaching perspectives to expository teaching allows teachers to have contact with different views on how to create conditions for students to learn, taking into account their social context.

Develop an understanding of how students think and learn mathematics

Sowder (2007) presents arguments indicating that teachers must know their students and understand their way of thinking. This makes the teacher try to grasp what students understand about the studied subject. When teachers examine their students' work, they gain insight into students' thinking and understanding. When done in collaboration with their peers, this process allows them to engage in discussions about the types of teaching strategies, make assumptions about students' knowledge, and reflect on the type of instruction received. It also helps teachers identify necessary adjustments in instruction to enhance student understanding and performance.

Develop pedagogical content knowledge

The notion of pedagogical content knowledge is associated with knowledge of a subject that needs to be taught, the need for teachers to develop knowledge aiming at reflecting and planning lessons, considering how certain mathematical content can be taught in a way that students learn significantly (Rodrigues, 2015).

For this, Sowder (2007) presents four central components of pedagogical content knowledge. The author states that these components can be useful in formative programs that aim to provide opportunities for the professional development of teachers: (a) comprehensive knowledge and beliefs about the purposes of mathematics teaching; (b) knowledge of students' possible understandings, conceptions and mistakes in mathematics; (c) knowledge of the mathematics curriculum and curriculum materials; and (d) knowledge of teaching strategies and representations for teaching specific topics in mathematics.

Sowder (2007) explains that these components are not independent, and that the first can be used as a "conceptual map" for decision-making in the classroom environment. The second covers the teaching knowledge acquired through the teacher's practice, considering students' understandings, beliefs, and possible errors in mathematics, which are particular to each student. The third is related to knowledge of the mathematics curriculum and curriculum resources. The fourth component refers to the different strategies the teacher can choose to work with a specific topic in mathematics.

Develop an understanding of the role of equity in school mathematics

Based on the standards of the National Council of Teachers of Mathematics (NCTM), Sowder (2007) points out that all students, regardless of their personal characteristics, experiences, or physical and cognitive challenges, should have opportunities to study and learn mathematics. Weissglass (1997) defined equity as a continuous process (not a product) of expanding our society's capacity and commitment to fully respect individuals as human beings with different social classes, cultures, genders, and values, and provide the necessary resources to assist people in the learning process.

Develop a sense of self as a math teacher

This objective seeks to build, recognize, and strengthen the teacher's professional identity as a mathematics teacher, and can be developed when teachers reflect on themselves, considering their values, beliefs, conceptions, emotions, and relationships (Sowder, 2007).

Methodological route

The work was developed together with the degree in mathematics at the Universidade Federal do Pampa in Itaqui-RS, through the curricular component of Supervised Teaching Practice in Mathematics Teaching II.

According to the Pedagogical Political Project (2017) in force, this component is offered to academics attending the 8th semester of the course and aims to develop topics related to youth and adult education (EJA) and inclusion in schools, through theoretical-analytical and legal studies related to EJA and inclusive education.

One of the motivations for the present study occurred through the development of the present stage and the concerns brought by the academics, in the context of classes at the university, arising from their experiences in the reality of schools. Based on these discussions,

it was essential to create a space for reflection and joint problematization with undergraduates, teacher educators, elementary school teachers, and administrators.

The class was made up of 14 undergraduates that had already developed the first teaching practice and discussed some issues arising from that process. Among the participants, some were grantees of the Institutional Scholarship Program for Teaching Initiation (PIBID), which brought more significant experience, as they were actively engaged in school activities on a weekly basis.

In this way, we organized the activities following some guidelines: (a) the students individually chose a topic related to the objectives proposed in the component; (b) did a theoretical study about what was researched; (c) shared the results from conversations with other colleagues; (d) visited schools to understand how the theoretical proposals they researched were being forwarded in schools; (e) finally, we invited some mathematics teachers from schools for the conversation circles where students could exchange their views on what they had studied in theory and experience in practice at schools.

This proposal took place in the first half of 2019, with the pre-service teachers mentioned, and four mathematics teachers who taught at the municipal and state schools, having the teaching practice supervisor as a mediator of the proposal. The conversation circles were held over four weeks, in weekly meetings of one hour each. This work, however, will focus on only one of the meetings and with one of the school teachers.

The volunteer for the conversation circle works in municipal and state schools, teaching elementary and high school students. Therefore, the teacher, who has more than 15 years of experience in basic education, is knowledgeable of the different school realities.

The conversation circle as a data collection method

We chose the conversation circle because it "enables participants to express, concomitantly, their impressions, concepts, opinions, and conceptions about the proposed theme, also allowing them to reflectively work on the manifestations presented by the group" (Henares de Melo & Cruz, 2014, p. 32).

The selection of conversation circles as a methodology for conducting research positions our study within the realm of qualitative approaches, which, according to Iervolino and Pelicioni (2001, p. 116), enables "[...] the researcher to verify how people evaluate an experience, idea, or event; how they define a problem and what opinions, feelings, and meanings are associated with certain phenomena".

The proposal planned to build an environment conducive to reflection from the search for answers coming from academics, from their research built in the university environment, and perceptions about school practice developed in schools. Through the debate promoted by the conversation circle, the discussions generated in this environment, the exchange of knowledge between undergraduates, basic education teachers, and teacher educators, we sought a confrontation between the theoretical knowledge developed in university and the practical knowledge constructed in schools. This reflective process for an educational praxis brings at its core a confrontation of realities that seek the same point in common, to change a work reality.

In this type of methodology, data is collected through group interviews, which, as highlighted by Iervolino and Pelicioni (2001), fosters interaction between the researcher and participants. This does not imply that it is a directive and closed process where questions and answers alternate, but rather a discussion focused on specific topics in which participants are encouraged to express opinions on the topic of interest.

In this methodological process, participants express their opinions on a specific topic, engaging in discussions without intending to establish a consensus. These opinions can be convergent or divergent, stimulating debate and controversy in a dynamic and ongoing way. In this interaction, the mediator must prioritize equal participation of all and meet the criteria for structuring the discussion (Henares de Melo & Cruz, 2014).

To register the produced data, we used audio recordings and written notes in the researcher's logbook of all actions in the group: speeches, reactions, and impressions, also noting the participants' awareness of their involvement by providing reports for this research.

To keep the anonymity and preserve the identity of research participants, we coded the subjects, using "T" for teachers and "A" for academics, followed by numbers from one to fourteen, corresponding to the number of pre-service teachers (academics). Thus, the code was T1, for the guest basic education teacher and A1, A2, A3,..., A14 for the pre-service teachers.

Discursive textual analysis: understanding the data

The analysis of the data produced followed the perspectives of Moraes and Galiazzi (2006), who deal with textual discursive analysis (TDA) and is characterized by being a qualitative analysis methodology, aiming to produce new understandings about the aspects and discourses in focus, based on an operations cycle composed of three phases, which are: unitarization, categorization, and communication.

Afterwards, we performed the disassembly of the produced texts, fragmenting them to obtain units of meaning. The units of sense originated with input in the model indicated by Sowder (2007). Once the unitarization part was finished, the second stage of the TDA, the categorization, began. We started this step by grouping similar units of sense, originating our categories, as shown in Table 1 below.

Table 1.

Categorization (Elaborated by the authors)

Analysis Unit Unit of Sense	Emerging categories	
Develop a shared vision;	How it was more productive for you, and less productive for me; It's different for you to sit down and solve the exercise;	Planning
Develop knowledge of mathematical content;	Man, now, how do I get out of here?	
Develop self-sense as a teacher;	I've always been very self-confident. I've done that, I don't do it anymore.	
Develop pedagogical content knowledge;	How is your planning? The planning, the planning that I used to do at the beginning, I don't do it anymore.	
Develop understanding of the role of equity;	He has cognitive problems, what will I teach? In fact, he just socializes.	Inclusion
Develop an understanding of how students think and learn mathematics;	Discussing how we're going to approach fractions. How did he learn to make an L.C.M., or is there another way to do it?	Contexts of action

The final categories in this process were: planning, inclusion, and contexts of action. After defining the categories, we prepared the interpretation, inference, and theorization of the analyzed data. In this sense, the metatext was constructed.

Results and discussion

When we started the conversation circle, our first discussion revolved around the afflictions of Stage II students regarding the practices observed by them in the school environment, especially in contact with teachers. This discussion generated our first category which will be analyzed here.

Category 1 – Planning: planning is a subject that emerged at different times in the speech of those involved in this training. We believe it is related to different objectives of the TPD, as it relates to Developing pedagogical content knowledge, because this objective is

associated with the knowledge of a subject that needs to be taught, the need for teachers to develop knowledge to reflect and plan classes, which was one of the reflections that stood out during the conversation circle. At the same time, it is related to Developing a sense of self as a teacher because, when reflecting on their classroom practices, the teacher also reflects on themselves, considering their values, beliefs, conceptions, emotions, and relationships.

These reflections are intertwined, which also makes them relate to the development of mathematical content knowledge; since, when talking about planning and reflecting on their practices, these are not separated from the contents to be taught, which, in turn, relates it to the Development of a shared vision; since during the debate with the students and the supervisor, it was possible to build their vision on the teaching and learning of mathematics together, all with their academic and practical point of view in the classroom.

So, we started our conversation by talking about how classes were planned in the supervised teaching practice. The pre-service teachers began reporting their observations of the practice, as soon as a question arised:

A1: How do you plan classes? How is your planning? You plan for the whole week, for the day?

For those who are going through the teaching practice, planning is fundamental. It requires much dedication from the student, and according to their reports, the greatest difficulty is combining theory with practice. Although much was discussed during the course, ways of teaching and learning and practice during the course did not occur because students still could not plan to use different strategies and teaching methods.

Developing Pedagogical Content Knowledge enables planning activities to be carried out together in future interventions, in an exchange of knowledge, as planning is essential and is just one of the many functions the profession requires. “The lesson planning stage is when the teacher reflects on the content that will be worked on, going through the methods that will be used to develop student learning, extending to student evaluation” (Lima, 2019, p. 32).

However, this is not revealed in the teacher’s words; we can see that planning is practically non-existent.

T1: With time you see it like this, the planning of sitting down, picking up several books for the planning as I did before, I don’t do it anymore.

In her speech, the teacher suggests that, over time, planning is no longer necessary, as the teacher already knows the content to be taught and uses the same planning or books already selected in previous years to teach. This is one of the teacher’s existing beliefs that must be handled, although sometimes, as Sowder (2007) states, teachers are not quite ready to abandon

old practices and beliefs. Changing these beliefs is not always easy, but creating situations that make them reflect on it is essential to start a process of change.

By developing a shared vision for mathematics teaching and learning, the exchange of experiences becomes so intense that it suggests an opportunity to work on this objective and certain beliefs, as revealed in the teacher's speech.

T1: You know, I already have the books, I already know the books I pick up. Oh, a new book arrived, chichichichi, that's it. My plan is ready. So that's what I say: the planning, the planning that I used to do at the beginning, I don't do it anymore. Honest! That's what happens. And that will happen to you, too... Not at first!

We understand that planning is necessary, it is an indispensable act of the teaching process, however for this to happen, it is necessary to provide the minimum working conditions for the teacher. In this direction, Diniz-Pereira (2010) emphasizes the importance of the principle of inseparability between education and the minimum conditions suitable for teaching work: decent wages, professional autonomy, exclusive dedication to a school, and time for planning.

The reality of basic education seems to disregard this relationship, as teachers continue to receive low wages and a tight workload, which does not allow for an adequate environment for a planning process to take place since, without an adequate structure, there is little room for them to improve and accomplish their work.

Teachers from other schools also seem not to carry out their planning for similar reasons, reports a pre-service teacher.

A1: I was talking to the teacher, and she said: no, now I'm going to tell you, like I already told the other girl, that I still want to work on decimals, geometry, and measurement units. And I'm like, cool, let's do it. And how do you intend to do that? Do you have more or less a plan, what are you going to do? Then, she just looked at me. She told me, yeah, I have it in my head.

However, although the teachers do not do the planning, they realize they need it. This fact emphasizes another objective to be highlighted in this process: developing a sense of self as a mathematics teacher, a process of self-reflection on oneself and one's pedagogical practice. This fact stands out in the pre-service teacher's comment when referring to the teacher's speech at school.

A1: Then, she told me: I don't do it, but it's good that you have to do it because, then, I don't get lost. It's good that you have to do it because then, we teach everything we have to teach.

Likewise, the importance of planning is revealed in the speech of the guest teacher when reporting an incident that occurred in her classes.

T1: I've always been very self-confident. I picked up a 3rd-grade math book there, tick-tick-tick. Let's do exercises 1, 2, 3,... Then, there was an exercise that... It's different if you sit down, and you solve the exercise, it's different from being in front of 35 (students) and you get stuck. Dude, now how do I get out of here? In front of the students, no. That's what I stopped doing. Then, the image for the students is that their teacher does not know the subject.

The teacher's reflection shows that not only planning is essential, but also mastering the content being taught. So that Developing knowledge of mathematical content is necessary and complements the act of planning. Concerned about the teacher's report, do the academics wonder what to do when this happens?

T1: I say like this. Let's stop there for a little bit. Wait, I'll solve it later and tomorrow I'll bring you the solution. And then, you beat yourself, you work yourself to death, and bring the solution the next day. If you don't, then, you are finished.

The teacher admits that overconfidence and lack of time for good planning are the factors that influence this process. She also admits that today, she no longer does that; she no longer takes risks. This situation emphasizes that, apparently, the teacher's classes are based only on textbooks. We believe that working together with in-service and pre-service teachers to develop a shared vision for teaching and learning mathematics, and developing pedagogical knowledge of the content, could contribute to a change in these beliefs while helping to understand the role of mathematics in the school context and understanding how the student learns and how classes can be planned.

This type of training must be worked on at a specific time within schools, on specific days when teachers can sit together and discuss, exchange experiences, even plan together. However, this does not depend only on teachers, but also on school management and public policies that may provide teachers with greater quality in their work. As Diniz-Pereira states:

Otherwise, we could assume, on one hand, that everything bad in school education is the teachers' fault or due to their "poor training" (blaming thesis); on the other hand, that teachers do not have anything to do with the school's current problems, being, therefore, just victims of a perverse and excluding social and educational system (victimization thesis) (Diniz-Pereira, 2010, p. 2).

Another category that is revealed in our conversation circle is related to the objective of developing the conception of the role of equity in teaching, by revealing a concern on the

part of academics about how, for example, the process of inclusion in schools has been happening.

Category 2 – Inclusion: we emphasize that we believe that, in a specific way, the concept of equity brought by Sowder (2007) is not equivalent to the strict sense of inclusion. However, generally, and understanding it as equity, in the sense of giving the same conditions to students from different realities, we can infer aspects that are also linked to inclusion.

An important reflection that emerged from the conversation circle, referring to a propositional aspect of the teaching practice component and this training activity is related to the debate that culminated in the point that one of the biggest concerns is how to teach these students, since classrooms often have more than twenty students who also need to be attended to.

Knowing that due attention is not given to planning as it should be, the academics wonder what the teacher's planning would be like then, with the included student.

T1: There isn't, just a leaflet, I take a book and give him a crossword. He has cognitive problems, what will I teach? In fact, he just socializes.

Again, what is perceived is the lack of planning and perhaps specific knowledge to work with these students, which is in line with what other teachers report when they say they do not have training that allows them to work with different special educational needs. For there to be inclusion in the school environment, the teacher and the school need to adapt to this new reality, as Sassaki (1999) points out when characterizing inclusion as:

> [...] the process by which society adapts to include people with special educational needs in its general social systems and, simultaneously, prepares them to assume their societal roles. Inclusion constitutes, then, a bilateral process in which people, still excluded, and society, seek, in partnership, to equate problems, decide on solutions, and effect equal opportunities for all" (Sassaki, 1999, p. 3).

What the author discusses seems to be happening in the school environment today. However, this opportunity for everyone requires teachers to readapt, to engage in a new way of working in which they were not prepared, and that, due to the terrible conditions found to carry out their work, cannot perform nor seek conditions for it.

Fox, Farrell, and Davis (2004) indicate that two interconnected key issues seem to be central to effectively including children with disabilities and who have special educational needs. The first refers to teachers' perceptions and experiences in regular education; the second is how support and adaptation are offered to students with disabilities in the classrooms. In a way, the second movement has been happening; but, in our view, teachers need more than

experience, they need training to succeed in this "new" scenario because, if teachers are not prepared during their academic-professional education, they can only do it in continuing education. Also, this is another category that stands out and is related to teachers' participation in continuing education activities.

Category 3 - Contexts of action: the debates resulting from the conversation circle took very specific directions, leading academics in a teaching practice context to reflect on their performance and relationship with university while teachers take into account the locus of work, the school. This debate is related to what Sowder (2007) describes with an objective that should provide those involved to present arguments that point out that the teacher must not only know their students and understand their way of thinking. It should also make the teacher reflect to comprehend what students understand about mathematics.

For this, the formation must provide opportunities for teachers to gain insight into students' thinking and understanding, discuss the types of strategies used for teaching, raise hypotheses about students' knowledge, the type of instruction learned, and the changes in instruction needed to improve understanding and performance. All these reflections walked in one direction, the continuing education offered in basic school, and the precariousness of its conditions.

Interacting with the academics, the teacher explained that there is almost no space for continuing education at school and, to prove this argument, she tells them that she works fifty hours a week, making a total of twenty-four periods only in the morning, with classes from Monday to Friday, with only a spare period of forty-five minutes during that time.

The teacher also argues that, with this workload, there is not even time for good planning, exchange of experiences with colleagues, even less to look for different methodologies or ways to develop her work.

T1: At school, we have donated netbooks and the digital whiteboard, but imagine, I have a period with the class, until I get to class, seat the students, go out to get the whiteboard, install it, the period is over. There is no way I can do it.

The teacher also criticizes the precariousness of the training offered in schools. According to her, every six months the schools offer training for three days after returning from vacation, but the way it has been developed does not provide productive learning moments.

T1: At school, there is that training at the beginning of vacations in July, which is a week, where a video is shown, some teachers sleep, and others talk during the presentation. There isn't an effective thing.

In relation to other formations that she has been carrying out outside the school environment, the teacher also did not show much enthusiasm when asked if the formations are satisfactory.

T1: But if training is done with math teachers, discussing how we are going to approach fractions, how we are going to approach such a thing, how it was more productive for you, and less productive for me, how he learned to do an L.M.C., or there is another way to do it, it would be much better, because you are discussing your area. Oh, I need to problematize more than just giving them L.C.M. to do, get it?

In her perception of the training offered, the teacher emphasizes some of the objectives proposed by Sowder (2007) that need to be developed in training that the TPD seeks. In this way, it is necessary to rethink the way in which training has been built and promote new activities "(...) that fulfill their role, contributing to the construction of a professional identity and focused on a practical change, which allows a space for the development of a new pedagogical praxis" (Leão et al., 2020, p.211).

In this sense, this activity revealed that the limitations of teaching practices are varied and that they depend both on a reformulation of the formative processes - which must be interconnected in a continuous movement- and on public policies that value the profession - regulating the work hours to provide qualification and planning-, and school management to monitor the training process, among others. Finally, this activity also showed that teachers have many opportunities for professional development.

Final considerations

During the research, we sought to understand how a formative activity such as the conversation circle in an academic-professional context provides opportunities for professional development for pre-service and basic education teachers that teach mathematics. To answer this problem, we rely on the objectives proposed by Sowder (2007), in which she points out that they should be present in the training of mathematics teachers who seek TPD. The results obtained by this proposal were quite encouraging, and pre-service teachers could share their experiences and hear from a teacher who is in school locus, the problems they have, and the reality they experience. However, for the school teacher, it was a moment when she could reflect on her actions and share these afflictions with future colleagues.

The activity provided moments of reflection, exchange of experiences, and reports of daily facts of the school context. However, from our point of view, specific and non-continuous

actions are not enough to make teachers significantly modify their teaching practice. Yet, this activity opened horizons for planning future formative actions that may involve other teachers and students in moments of planning, the study of content and methodologies for teaching mathematics, exchange of experiences among peers, activities that seek problem situations to build reflections on teaching practice, seeking solutions together from activities proposed to the students, thus carrying out an action on reflection.

Making continuous education a study laboratory capable of enabling the teacher to analyze students' difficulties and way of thinking, which will allow them not only to reflect on the teaching-learning-assessment processes and forms of inclusion but also to seek, in a theoretical-practical dialogue, ways to solve such problems, which will promote the development of a teaching praxis.

The activity also showed us many problems to be faced, such as the lack of interest of teachers in participating in the formation, since these are not linked to their area of knowledge. Another fact to be highlighted that contributes to this lack of interest is directly linked to teachers' working conditions, such as lacking time for planning, low wages, and the time reserved for this type of training. In some cases, the teacher has been working in three shifts to make ends meet and has been facing serious problems with state wage arrears of more than two years, which limits training time.

The rulers and creators of public policies should be responsible for the TPD and promote training in locus, in weekly meetings, in moments especially reserved for that, promoting partnerships between schools and other teacher education institutions, such as universities. This way, meetings could occur at set times, promoting case studies and making the school a genuine research laboratory. Discuss concepts; carry out studies of different contents; analyze and practice differentiated teaching methods in their classrooms; develop case analyses; problems arising from the school itself, seeking an interaction between peers, in an exchange of experiences and knowledge built within the teaching career and in the confrontation with theories in the search for a social confrontation capable of making them review their beliefs about teaching, providing the development of reflection and teaching practice.

Reinforcing this idea, we understand that in order to obtain practical professional knowledge, professional development actions must include another trivial factor in their objectives: the awareness of the need to be constantly in formation, that is, that the teacher considers the importance of being in constant learning, which is the main object of teaching, so they should make use of mathematics for teaching, combining mathematical and

pedagogical knowledge. This process aims to be reviewing mathematical concepts, teaching methodologies, and analyzing problems arising from their social environment, among many other tasks.

Furthermore, this training is focused on building a teaching praxis, capable of revising old educational practices and building new ones, based on reflection on action and from action over reflection. Since the main objective of the TPD is the student and the development of their abilities to solve complex problems, it must reach the teacher and their abilities to learn in the first place, that is, it must provide opportunities for teachers to learn.

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