



Analyzing Indications of Characteristic and Constitutive Aspects of the Collaborative Work of Teachers who Teach Mathematics

Douglas da Silva Tinti¹

Universidade Federal de Ouro Preto - UFOP

Wanusa Rodrigues da Silva²

Secretaria Municipal de Educação de São Paulo – SME-SP

Ana Lúcia Manrique³

Pontifícia Universidade Católica de São Paulo – PUC/SP

ABSTRACT

This article aims to identify and analyze evidence of characteristic and constitutive aspects of collaborative work among a group of mathematics teachers. The chosen group was formed based on a project developed within the scope of the Education Observatory Program (Obeduc) from June 2013 to June 2017. To achieve the proposed objective, we conducted a meta-analytical study focusing on research that investigated the group in question. In this regard, two doctoral and three master's theses were considered. The analysis categories listed were indications of voluntariness, identity, and spontaneity; indications of shared leadership and co-responsibility; and indications of support, mutual respect, and reciprocal learning. We concluded that considering the group's longitudinal perspective, it was possible to demonstrate the mobilization of various learnings, anchored in mutual support and respect among members.

Keywords: Obeduc; Mathematics teacher education; Collaborative groups; Meta-analysis.

Análise de indícios de aspectos característicos e constitutivos do trabalho colaborativo de um grupo de professores que ensinam matemática

RESUMO

O presente artigo tem por objetivo identificar e analisar indícios de aspectos característicos e constitutivos do trabalho colaborativo de um grupo de professores que ensinam matemática. O grupo elegido constituiu-se a partir de um projeto desenvolvido no âmbito do Programa Observatório da Educação (Obeduc) e desenvolveu atividades no período de junho de 2013 a junho de 2017. Para atingir o objetivo proposto, realizamos um estudo

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¹ Doutor em Educação Matemática pela Pontifícia Universidade Católica de São Paulo. Docente do Departamento de Educação Matemática (DEEMA) da Universidade Federal de Ouro Preto (UFOP), Ouro Preto, Minas Gerais, Brasil. Endereço para correspondência: Campus Morro do Cruzeiro, Instituto de Ciências Exatas e Biológicas (ICEB) – Departamento de Educação Matemática, Ouro Preto, Minas Gerais, Brasil, CEP: 35400-000. ORCID: <https://orcid.org/0000-0001-8332-5414>. E-mail: tinti@ufop.edu.br.

² Doutora em Educação Matemática, PUC-SP. Diretora de Escola (SME-SP) e Docente (Centro Universitário São Camilo), São Paulo, SP, Brasil. Endereço para correspondência: Avenida Vereador Emílio Meneghini, 357, apartamento 36B, Vila Carrão, São Paulo, SP, Brasil, CEP 03474-017. ORCID: <https://orcid.org/0000-0001-5006-1707>. E-mail: wanusa_rodrigues@hotmail.com.

³ Livre Docente pela Pontifícia Universidade Católica de São Paulo (PUC-SP). Coordenadora do PPG Educação Matemática PUC-SP, São Paulo, SP, Brasil. Endereço para correspondência: Rua Marquês de Paranaguá, nº 111, Consolação São Paulo. CEP 01303-050. ORCID: <https://orcid.org/0000-0002-7642-0381>. E-mail: analuciamanrique@gmail.com.

meta-analítico focalizando em pesquisas que investigaram o grupo em questão. Assim, foram consideradas duas teses de doutorado e três dissertações de mestrado. As categorias de análise elencadas foram: indícios de voluntariedade, identidade e espontaneidade; indícios de liderança compartilhada e corresponsabilidade; e indícios de apoio, respeito mútuo e reciprocidade de aprendizagem. Concluímos que, considerando a perspectiva longitudinal do grupo, foi possível evidenciar a mobilização de diferentes aprendizagens, ancoradas no apoio e respeito mútuo entre os membros.

Palavras-chave: Obeduc; Formação de professores que ensinam matemática; Grupos colaborativos; Meta-análise.

Análisis de indicios de aspectos característicos y constitutivos del trabajo colaborativo de un grupo de profesores que enseñan matemáticas

RESUMEN

El presente artículo tiene como objetivo identificar y analizar indicios de aspectos característicos y constitutivos del trabajo colaborativo de un grupo de profesores que enseñan matemáticas. El grupo elegido se constituyó a partir de un proyecto desarrollado en el ámbito del Programa Observatorio de la Educación (Obeduc) de junio de 2013 a junio de 2017. Para lograr el objetivo propuesto, realizamos un estudio meta-analítico enfocado en investigaciones que examinaron el grupo en cuestión. Así, se consideraron dos tesis de doctorado y tres disertaciones de maestría. Las categorías de análisis enumeradas fueron: indicios de voluntariedad, identidad y espontaneidad; indicios de liderazgo compartido y corresponsabilidad; e indicios de apoyo, respeto mutuo y reciprocidad de aprendizaje. Concluimos que, considerando la perspectiva longitudinal del grupo, fue posible evidenciar la movilización de diferentes aprendizajes, anclados en el apoyo y respeto mutuo entre los integrantes.

Palabras clave: Obeduc; Formación de profesores que enseñan matemáticas; Grupos colaborativos; Metaanálisis.

INTRODUCTION

Teachers' collaborative work and, consequently, research on collaborative groups of teachers who teach mathematics has been boosted lately as a response to worldwide social, political, cultural, and technological changes, and indeed impacted teachers' education and work (FERREIRA, 2003; FIORENTINI, 2004; NACARATO, 2005).

We agree that the individualized work and loneliness of teaching are characteristics that, although long present in teachers' practices (CUNHA, 2012), must be rethought and overcome to foster more welcoming and collaborative formative and professional environments, especially for early-career teachers.

To highlight the academic production fostered by the emergence of collaborative groups among teachers, we present the *Simpósios Nacionais de Grupos Colaborativos e de Aprendizagem do Professor que Ensina Matemática* (National symposiums on collaborative groups and learning for teachers who teach mathematics), which held its 4th edition in 2018. This event has allowed researchers to share experiences and practices that emerged from members' collaborative and co-responsible formative contexts.

Likewise, we would like to draw attention to the thematic dossier published in *Revista da Sociedade Brasileira de Educação Matemática* – Regional São Paulo, Brazil

(REMat-SP) (Journal of the Brazilian Society of Mathematics Education) in 2017, entitled “Mathematics Education and Collaborative and Learning Groups for Teachers who Teach Mathematics”. The articles in this dossier indicate that collaborative groups have been constituted in formative spaces that go beyond the directed logic of traditional formative models proposed, often by teaching networks or universities, and contribute to the education of teachers in a school context (TINTI, 2017).

As an example of collaborative spaces created intentionally to promote the initial and continuing education of teachers who teach mathematics, we can mention the case of a group of in-service and pre-service teachers in partnership with a research group in mathematics education at the Pontifical Catholic University of São Paulo (PUC-SP), active from June 2013 and June 2017, created as part of Public Notice 049/2012/CAPES/INEP of the Education Observatory program (Observatório da Educação - Obeduc).

This group, which we will call the “Grupo Obeduc” (Obeduc Group), was the inquiry object of two doctoral and three master’s theses (TINTI, 2016; LACERDA, 2017; and RAMOS, 2015; BARROS, 2016; BONETO, 2016, respectively), in addition to several other published articles and books. Therefore, it is worthwhile to analyze the results of such studies on the collaborative work of the group the researchers focused.

Thus, this article aims to identify and analyze indications of characteristic and constitutive aspects of the collaborative work of the Obeduc Group, as we understand that they can be valuable for the teacher education field. For that, based on theoretical frameworks that deal with collaboration, we aimed to identify and analyze the research results of the mentioned studies with regard to the collaborative dimension of the work among in-service and pre-service teachers who teach mathematics in a working group.

Characteristic and constitutive aspects of collaborative work

According to Hargreaves (1998), as we live in a world where problems are increasingly unpredictable and solutions are less clear-cut, individual work has given way to collaborative work. In the school context, collaboration can be defined as a “metaparadigm of educational and organizational change in the postmodern age” or even as an “articulating and integrating principle of action, planning, culture, development, organization and research” (HARGREAVES, 1998, p. 277), being taken, therefore, as a positive and desirable aspect in the practices of groups of teachers.

However, collaborative work among teachers does not arise spontaneously or naturally. Instead, it results from a process, a continuum that starts from conflict to collaboration, going through moments of competition and cooperation (FIORENTINI, 2004). In this sense, we wish to elucidate the characteristic and constitutive aspects of collaborative work pointed out by the literature so that we can identify them in the trajectory of the Obeduc Group.

We consider Fiorentini's (2004) standpoint, who summarized what he thinks to be the fundamental and characteristic principles of collaborative work among teachers in three categories.

Volunteering, identity, and spontaneity

For a group to be considered authentically collaborative, the participants must be volunteers in the sense that they have not been coerced by anyone. They participate in the group because they want to, and the relationships flow naturally, not artificially or conditioned by external factors.

Regarding spontaneity, Fiorentini (2004) points out that several factors can encourage a teacher to be willing to participate in a collaborative group. In any case, what moves him or her is a "desire to study and work in partnership with other professionals, which results from a feeling of incompleteness as a professional and the perception that, alone, it is difficult to manage this endeavour" (p. 60).

This aspect makes us think that forming a collaborative group requires time for people to get to know each other, feel comfortable and belonging to the collective. Therefore, no group is "born" collaborative; it becomes collaborative as its participants gain autonomy in their practices and develop their own identities.

According to Fiorentini (2004), group members do not identify with each other because they are like-minded but because they can share problems, experiences, and goals. Collaborative groups usually consist of individuals with different points of view and understandings on a specific topic but willing to negotiate and reflect on a shared interest.

Shared leadership and co-responsibility

According to Fiorentini (2004), a group is collaborative when it negotiates the responsibilities among its members. The joint endeavour, i.e., what the group intends to achieve, results from all members' understanding. This aspect is vital for the collaborative

dimension, as the feeling of belonging and the commitment shared by all depend on it. This means that “in an authentically collaborative process, everyone assumes the responsibility of fulfilling and enforcing the group’s agreements, bearing in mind their common objectives” (p. 62).

However, the principle of co-responsibility does not imply the absence of leadership. On the contrary, this implies that the group can autonomously define the member that can coordinate a given activity, based on their knowledge, concepts, and different backgrounds. Every group member can take on a leadership role at different times. For this reason, Fiorentini (2004) refers to a shared leadership that weakens the hierarchical and power relations so present in teacher education groups.

We also realize that some individuals have stronger leadership skills than others. In this sense, Fiorentini (2004) emphasizes that they will probably be indicated more frequently to assume coordination tasks. Furthermore, we cannot fail to mention that spaces where different individuals interact are suffused with conflicts and contradictions, which is no different in collaborative groups. However, co-responsibility motivates collaborative group members to negotiate and revise agreements whenever necessary.

Support, mutual respect, and reciprocal learning

Fiorentini (2004) warns us that the sustainability of a collaborative group depends on mutual support and respect among its members. Support can be intellectual, technical, or emotional. As people feel they belong, they express expectations, anxieties, and frustrations in professional practice and expect to be heard and accepted in their dilemmas.

In this sense, mutual respect involves recognizing the knowledge each teacher brings to a group context, which may be conceptual knowledge or knowledge from experience (TARDIF, 2002). In a collaborative group, people collectively engage in finding solutions to presented problems. Mutual respect contributes to teachers’ self-esteem and confidence because “knowing that [a teacher] can count on the support of a colleague, no one is afraid to share some failure or unsuccessful attempt to change school practice” (FIORENTINI, 2004, p. 64).

A collaborative group can, through shared reflection, learn new things about teaching work and reframe teachers’ knowledge and practices. According to Fiorentini (2004, p. 65), in this context, “the participants feel free to express what they think and feel and are willing to listen to criticism and change”.

Fiorentini (2004) also reminds us of the important role played by universities as a partner that can offer theoretical and methodological support to school teachers. At the same time, academics also learn from their teachers' experiences, establishing a reciprocal learning relationship. All participants learn from each other. Reciprocity also happens between practiced and early-career teachers and in-service and pre-service teachers.

Methodological trajectory

As previously mentioned, this article aims to identify and analyze evidence of characteristic and constitutive aspects of the collaborative work of a group of teachers who teach mathematics. We assume the viewpoint of a meta-analytical type qualitative study which, according to Fiorentini and Lorenzato (2006, p. 103), is "a systematic review of other studies, aiming to carry out a critical evaluation of them and/or produce new results or syntheses from the confrontation of these studies transcending those previously obtained".

To achieve the proposed objective, we considered taking as the corpus of analysis the research works by Ramos (2015), Barros (2016), Boneto (2016), Tinti (2016), and Lacerda (2017). The option for these studies is justified because they are carried out by members of the Obeduc Group and present data about its trajectory and, above all, because they consider a theoretical perspective⁴ different from the perspective of a collaborative group.

In possession of the cited studies, we read them in full to identify the characteristic and constitutive aspects of collaborative work as presented by Fiorentini (2004). Thus, we assume as categories of analysis in this article: a) voluntariness, identity and spontaneousness; b) shared leadership and co-responsibility; and c) support, mutual respect, and reciprocal learning.

Considering the timeframe of the group's meetings (2013 to 2017), it is essential to note that we do not intend to cover all the data and/or results of the analyzed surveys. We aim to identify whether and how these elements were present in the trajectory of the Obeduc Group so that we can verify whether it was characterized and constituted as a collaborative group.

⁴ These studies assumed the perspective of the communities of practice advocated by the researcher Étienne Wenger.

ANALYSIS

Next, we briefly present the trajectory of the Obeduc Group. Then, we will analyze the highlighted collaborative aspects.

A little about the trajectory of the Obeduc Group

The Obeduc Group was formed based on a research project approved under Public Notice 049/2012/CAPES/INEP of the Education Observatory Program – Obeduc. This very heterogeneous group began its activities in June 2013, encompassing mathematics teachers at different career times and who taught at different levels.

At the beginning of the activities, the group consisted of a researcher, four postgraduate students, three elementary school early years and three final years teachers, three pedagogy students, and three mathematics degree students. Due to the diverse composition of the group, we wanted members to build trust, confidence, and a sense of partnership and mutual commitment during the meetings. As the meetings were held on Saturday mornings, the postgraduate members of the Obeduc Group always organized a breakfast to welcome the other members, which made all seek to strengthen the bonds of friendship and dialogue around the table. It is important to say that, throughout the group's trajectory, this practice was incorporated by the other members to the point of proposing a schedule and indicating those responsible for organizing the moment throughout the meetings.

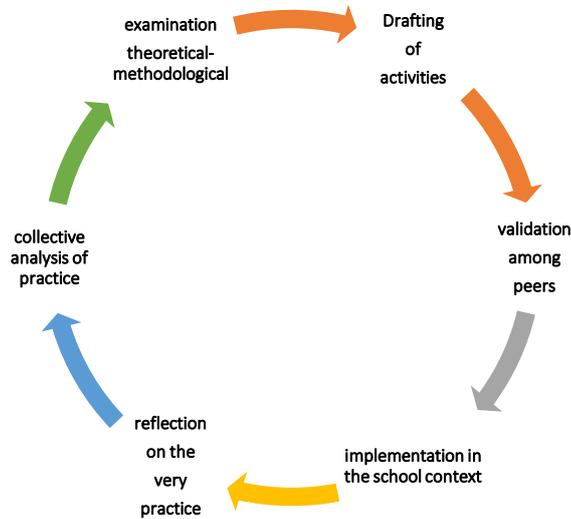
During the meetings in 2013, the members carried out different actions, such as: joint elaboration of concept maps; writing and socialization of memorials and narratives of the formation; mapping of resources and pedagogical resources; preparation of lesson plans; reflection and debate of academic texts on the teaching of mathematics and the teaching profession; negotiation of collaborative work; and definition of a shared learning agenda.

It is also noteworthy that the members were fully engaged in the actions defined collectively, which had not been established beforehand but based on the expectations, the formative needs of the members in relation to mathematics teaching, and the mutual engagement of the Obeduc Group members. In this process, a WhatsApp group was proposed and created to facilitate communication among members, and an email to centralize official interactions.

Among the topics chosen for further study in 2013, we highlight problem solving as a mathematics teaching and learning strategy. The Obeduc Group embarked on a study

initiative to bridge theory and practice. Thus, besides seminars to study academic texts about problem solving, they wanted to experience a process that covered the following dynamics:

Figure 1 – Work dynamics of the Obeduc Group



Source: Elaborated by the authors (2020)

The dynamics assumed by the Obeduc Group in 2013, as shown in Figure 1, provided reflections on the practice, and, as a group with unique characteristics, it enabled members to expose their difficulties with content, for example. In this sense, some members could share with the group what they did not know about certain mathematical contents, such as ratios, proportions, least common multiple, and equivalent fractions. Some members also noted that they were unfamiliar with a protractors and how to use them. The group responded to these difficulties by working to clarify the doubts and suggesting some resources to help members overcome the challenges, which fostered an environment of sharing and, most importantly, trust among the members.

The processes indicated in Figure 1 were present throughout the group's trajectory – some actions were more pronounced at specific times, while at others, they were less so. For example, in part of 2014, the group elected new mathematical concepts to continue working with problem solving. In this context, the group analyzed classroom episodes in video form; produced, shared, and reflected on narratives elaborated by the members; and produced articles and experience reports aimed at academic events.

The meetings in 2014 were especially marked by the presence of external guests, members' participation in scientific events, and writing processes and reflection on the

practice. Furthermore, from 2014 onwards, some members departed, and others joined the group.

Over time, the composition and number of members changed at times. During the period, among various situations, some students finished their studies, allowing others to join the group. Some joined the master's program and continued participating in the group as master's students. Others who participated as students joined the group as teachers (LACERDA, 2017, p. 19).

As evidenced, the excerpt refers to the movements of members joining and leaving the group, an aspect inherent to the movement and dynamics of groups of this nature.

In 2015 and 2016, the group chose new mathematical concepts to trigger the dynamics detailed in Figure 1. The Obeduc Group members also started documenting their practices, writing about them and about the impact the formative actions had on them. In 2017, the year the project, linked to the Education Observatory program, members began reflecting on its contributions to establishing formative spaces that could promote collaborative work in teacher education.

Indications of willingness, identity, and spontaneousness in the Obeduc Group

As previously mentioned, the Obeduc Group was constituted based on a Public Notice, therefore, it is important to clarify that the group was composed of volunteers, meaning that individuals chose to participate willingly, without expecting payment or compensation. When analyzing research by Ramos (2015), Barros (2016), Boneto (2016), Tinti (2016), and Lacerda (2017), we realized that some participants in the group were scholarship holders. Nevertheless, all of them volunteered; they wanted to participate and engage in a training process.

At first, they were motivated by the shared goal of improving teaching to teach mathematics in elementary school. The members hoped they could share experiences and perceptions, learn mathematics, and improve teaching practice. The first actions proposed were intended to create trust, integration, and partnership among the participants. We believed it was necessary to create the group's identity and align members' perspectives and expectations in relation to the work we intended to develop during the four years of the Obeduc project (LACERDA, 2017, p. 75).

In this sense, the surveys revealed that the Obeduc Group began to meet in June 2013, with a group of researchers from the university taking the lead and organizing the first

meetings. We also observed an intention that the group would increasingly assume a collaborative perspective.

Besides our efforts to create and strengthen participants' bonds, we noticed that the first activities of the Obeduc Group were based on formative devices that mobilize self-writing, reading, listening, and reflection.

Initially, from the narratives created, the group analyzed emotions, difficulties of the practice, and the subtext of the role each one played. Reflective texts were mottos for deep discussions. During the exchanges, teachers got to know each other, learning to look at each other and expose their own anxieties about the challenges encountered and the mathematical knowledge they needed to work as mathematics teachers. The exercises of knowing and getting to know oneself were important for forming the group's identity so that each member could expose their difficulties and ideas about their professional role (BARROS, 2016, p. 66).

Another important observation we made, and we would like to highlight, is that the Obeduc Group respected some members' feelings when they verbalized that they still could not engage in any of the activities the group had defined, although they did bring out the spontaneity of some participants. Despite this, over time, all members engaged in sharing writing experiences, including creating a memorial of the training. The following excerpt exemplifies some of the feelings that permeated the meetings of the Obeduc Group.

I'll say that I didn't feel comfortable doing it. [...] I'll be very honest! I didn't feel comfortable talking about my life and forwarding it to people I'm just getting to know. Because it is a memorial of life. [...] Because we are still getting to know each other. If it was an activity that was done in a while, when we had a greater affinity, I would feel more at ease and less destabilized (TINTI, 2016, p. 147).

The analysis indicated that the actions triggered in the first year of the Obeduc Group's existence helped to shape and strengthen the group's identity. However, Boneto (2016, p. 43) draws attention to several simultaneous processes that are mobilized, of which members are often unaware.

[...] it was possible to visualize both the construction processes of a formative space in which there was mutual participation and tensions and conflicts [...]. In addition, the "discomfort" (and here we do not characterize it as positive or negative) was noticeable in the face of this collective construction movement within the group.

When the members joined the group formed within a project affiliated with a public program, they nurtured expectations and conceptions regarding how the formative processes would be conducted. However, our analyses indicate that collaborative practices were not

part of the members' memory and previous conceptions. About this movement of construction of a collaborative identity in a group, Costa (2011, p. 55) warns us that:

[...] Collaborative work is characterized by unpredictability. It is not possible to predict with certainty what the next steps will be for the group, as well as the effects they will have on teaching practice. Thus, a collaborative group in formation must be open to dialogue and negotiation in decision-making, considering that the group manages the progress of the works.

So, the surveys analyzed indicated that the Obeduc Group was initially organized in a hierarchical structure, given its link with the Obeduc program. However, we expected this formative space to assume a collaborative perspective. Like Costa and Oliveira (2019, p. 106), "we understand collaborative work as a practice that is not imposed, but built by participating members of groups, involving trust, sharing ideas, and mutual help to achieve common goals". The following excerpt shows the intention of the team that proposed the project to explain what they did not want for the Obeduc Group.

We bring here a proposal, but we going to define it as a group. So, we don't want [the training] to be as we commented elsewhere: I go to the formative course, somebody screens someting, and I just sit and receive the training. I must engage, participate, so this space makes sense [...] otherwise we come here unwillingly, it is absurd. What do you think? (TINTI, 2016, p. 161).

Thus, in addition to prioritizing dialogue and collective decision-making, one of the strategies to break with the hierarchical structure was to mobilize actions that would allow members to assume different roles in the group, as presented below.

Indications of shared leadership and co-responsibility in the Obeduc Group

Showing the strengthening of ties, the group defined some important activities to support the dynamics and registers of the meetings. Among them, we highlight the creation of an email and the audio recording of the meetings, as Tinti (2016, p. 152) evidenced: "With these choices, the group designated somebody to take care of the email and the recordings of the meetings".

In this context, we highlight that other activities were proposed to contemplate other members' skills and preferences when playing a specific role in the group.

During the work, they alternated the coordination of the meetings to minimize the feeling that someone was in charge and strengthen the spirit of participation and

responsibility of all in the group's journey. Thus, the activities were negotiated jointly by the participants (LACERDA, 2017, p. 87).

This movement takes us back to a relevant aspect of collaboration highlighted by Boavida and Ponte (2002, p. 1), that is, “collaboration constitutes a fundamental strategy for dealing with problems that seem too heavy to be faced individually [...]”.

We dare to say that creating this space may have been very complex. On the one hand, the group encompassed pedagogy and mathematics pre-service and in-service teachers at different times in their practice (early-career and experienced teachers); on the other hand, masters' degree holders and PhDs who, by the very nature of their positions, carry with them beliefs, conceptions, in addition to *status* and *habitus*. However, this confluence of differences, together with the intentional or unconscious disruption of *habitus* and the expression of affections (with their tensions and conflicts), became fundamental pieces for the constitution [of the group], where the title ceased to be segregating and potentialized the collective construction processes. In that space, all members became equally and potentially important. And, for us, awareness was the driving force behind this cyclical movement (BONETO, 2016, p. 56).

Regarding co-responsibility, Ramos (2015) tells us that, given the desire to have a practical experience from the problem solving perspective, the Obeduc Group split into two smaller subgroups and chose, at a certain point, the content “fractions” to start planning activities. Before developing the planned activity in the school context, each subgroup organized itself to conduct a simulation by applying the proposal to the other subgroup. In this way, they all shared the responsibility and commitment regarding the alignment of activities before they took them to the schools. In addition, the groups split up to monitor and provide support on the day of the implementation of the activities with the students, which provided the necessary support for registers such as audio/video recording, which were essential for reflection a posteriori.

In studies related to problem solving, we conducted a bibliographic mapping on the topic and socialized it in the group. This action helped us summarize the texts produced and share the understandings and queries that arose. During these studies, aiming to have practical experiences from this methodological perspective according to what was being studied, as initially proposed, the participants prepared mathematics tasks, which involved some of the participants' reflection, and which they developed in the classrooms (LACERDA, 2017, p. 89-90).

We realized that the Obeduc Group, over time, also developed a posture of mutual support and respect, as explained below.

Signs of support, mutual respect, and reciprocal learning in the Obeduc Group

Mutual support and respect are usually conditions that take time to be incorporated into group dynamics. As previously mentioned, the teachers and students in Obeduc Group developed a relationship of trust and respect as they progressed through the meetings, to the point where they felt comfortable expressing their opinions and sharing written productions.

Regarding learning mobilized in the group, we understand it from the situated learning theory (LAVE; WENGER, 1991) perspective, which indicates that every activity (including learning) is situated in the relationships between people, contexts, and practices.

[...] the learning trajectory to be covered by the CoP⁵ OBEDUC PUC-SP was not established beforehand but was defined based on the expectations, the formative needs of the members [in] relation to mathematics teaching and the mutual engagement/commitment of the members in the endeavours (TINTI, 2016, p. 170).

As this group is composed of teachers who teach mathematics, it is important to highlight that:

[...] learning to teach mathematics was always present, as it was made up of mathematics and pedagogy professors and students who were invited to join the CoP, knowing beforehand that the subject of studies would be mathematics (LACERDA, 2017, p. 122).

Regarding learning reciprocity, we can highlight that specialists learned from generalists in the same way that generalists learned from specialists. Ramos (2015) tells us that, although each group member did thorough research on problem solving, the Obeduc Group took a stand towards wanting to share learning through debates and conversations and written texts. The intention was to compare and enrich the interpretations in a reciprocal process of reframing concepts and mutual commitment to what was collectively agreed. Boneto (2016, p. 53) agrees, stating:

[...] We noticed the importance given to the “mutual commitment in search of collective learning” from the belonging and collaboration of all. It seems to us that individuals sought the “fulfilment” of these responsibilities (determined spontaneously and indirectly), showing to be uncomfortable when they believed they were not “performing” this role and, therefore, failing to fulfil an accepted commitment [...].

5 Community of Practice.

In the understanding of Araújo (2014), this movement favors the establishment of a “collective culture”; that is, the group members recognize what they know, what others know, and what everyone does not know. The author believes these attitudes result in the search for overcoming the limits of the group. “[...] not knowing was as valued as knowing and sometimes even more important and, in this way, it should be expressed so that it became an object of study” (BONETO, 2016, p. 55).

In this context, Tinti (2016) points out that, during its trajectory, Obeduc Group mobilized different types of learning, such as: writing and reflection on one’s own practice; construction of conceptual maps; constitution and belonging to a group; dealing with the diversity of profiles and trajectories within the group; reflection and research on one’s own practice; understanding of narratives as tools for training and reflection on practice; creation of individual and collective activities, involving the problem solving perspective; study and handling of manipulative resources aimed at mathematics teaching, more specifically on the concept of fractional numbers; reflection on the practice; individual and shared writing about that practice; overcoming nervousness and insecurity when performing in public; listening and accepting the criticism of the other.

Among these learnings, Tinti (2016) and Barros (2016) say that members’ reflective writing improved over time. At first, they wrote narratives about their academic trajectories. After about a year of meetings, they began to engage in the production of practice reports for participation in scientific events. This movement triggered other learnings, such as communicating a scientific work – which had the mutual support of the group:

Some members of the group, who were presenting their academic works for the first time, received the support of experienced members. An individual’s composure when presenting a research paper is suitable proof that participating in all stages of the process, i.e., planning, execution, reflections, negotiations of meaning, the search for theories, the writing process, and the preparation for presentations structure the speeches and provide the necessary confidence for the individual to defend their work in a conversation circle or debates in a research presentation (BARROS, 2016, p. 81).

In this way, we recognize that a group in which support and mutual respect are fundamental pillars can be fertile ground to mobilize learning.

FINAL CONSIDERATIONS

In this article, we aimed to identify and analyze evidence of characteristic and constitutive aspects of collaborative work among a group of teachers who teach mathematics. This movement emerged from different contexts in which we documented the

formative experiences promoted and, up to that point, examined through a different theoretical lens. At various points, we were asked whether the group had indeed become collaborative. After re-examining the trajectory of the Obeduc Group, we believe we have the necessary elements to address these inquiries.

When considering voluntariness, spontaneity, and identity, we demonstrated that the members voluntarily adhered to the proposal of composing a group to develop a formative space based on the processes of teaching and learning mathematics. The data showed that during the meetings, the members started to develop a rapport, enabling them to act spontaneously. There was also evidence of a movement towards the constitution of a group identity, which was shaped over time.

The analysis of shared leadership and co-responsibility showed that the group began with a hierarchical structure that gradually weakened as members became more engaged and embraced new roles. The context highlighted the remarkable aspect of co-responsibility, which, in turn, impacted the group dynamics.

Finally, considering the longitudinal perspective of the group, it was possible to show that different learnings were mobilized, anchored in the support and mutual respect among the members. Thus, we conclude that the trajectory of the Obeduc Group showed signs of characteristic and constitutive aspects of collaborative work, which leads us to think of developing new studies such as understanding in which situation a community of practice can be collaborative.

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