

“I believe in the work I do on the outside”: exploring teachers’ agency through participation in a professional master’s degree

“Eu acredito no trabalho que faço por fora”: Explorando a agência dos professores com base na participação em um mestrado profissional

“Yo creo en el trabajo que hago por fuera”: Explorando la agencia profesional a partir de la participación en una maestría profesional

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ABSTRACT

This article presents a case study centered on a primary teacher who graduated from a professional master’s degree (PMD). Adopting a sociocultural perspective, we employ the notion of professional agency to analyze how the teacher introduced and negotiated changes in her teaching practice drawing from her participation in the PMD. Considering that agency is exercised at present, informed by past experiences, and oriented toward the future, we carry out a narrative analysis of the data. The findings show that, by retrieving and reframing resources coming from the PMD, the teacher strategically negotiated opportunities for exercising her agency. Acting amid the practices legitimated in her school, she carefully cultivated gaps in which she conceived and directed her teaching practice considering her intentions and principles. This case study contributes to the field by identifying features of teacher-education initiatives that facilitate sustainable educational change.

Keywords: Professional Agency. Professional Master’s Degree. Mathematics Teaching. Narrative Analysis.

RESUMO

O artigo apresenta um estudo de caso centrado em uma professora egressa de um mestrado profissional (MP). Adotando uma perspectiva sociocultural, utilizamos a noção de agência profissional para analisar como a professora introduziu e negociou mudanças em suas práticas de ensino com base em sua participação no MP. Considerando que a agência se exerce no presente, mas é informada por experiências passadas e orientada para o futuro, desenvolvemos uma análise narrativa dos dados. Os resultados mostram que a professora negociava estrategicamente oportunidades para exercer sua agência recuperando e transformando recursos vindos do MP. Atuando em meio às práticas

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legitimadas na sua escola, ela cuidadosamente criava brechas nas quais orientava sua prática de ensino conforme as suas próprias intenções e princípios. O caso contribui ao campo de pesquisa identificando características das iniciativas de formação que facilitam mudanças educacionais sustentáveis ao longo do tempo.

Palavras-chave: Agência Profissional. Mestrado Profissional. Ensino da Matemática. Análise Narrativa.

RESUMEN

Este artículo presenta un estudio de caso centrado en una profesora de nivel primario, Julia, egresada de una maestría profesional (MP). Adoptando una perspectiva sociocultural, utilizamos la noción de agencia profesional para analizar como la profesora introducía y negociaba cambios en sus prácticas a partir de su participación en la MP. Considerando que la agencia se ejerce en el presente, pero está informada por experiencias pasadas y orientada al futuro, desarrollamos un análisis narrativo de los datos. Los resultados muestran que, recuperando y transformando recursos de la MP, Julia negociaba estratégicamente oportunidades para ejercer su agencia. Actuando en medio de las prácticas legitimadas en su escuela, ella cultivaba brechas en las cuales actuaba sobre sus prácticas a partir de sus intenciones y principios. El estudio de caso contribuye al campo identificando características de las iniciativas de formación que facilitan transformaciones educativas que perduran en el tiempo.

Palabras clave: Agencia Profesional. Maestría Profesional. Enseñanza de la Matemática, Análisis Narrativa.

INTRODUCTION

In-service teacher-education initiatives are crucial opportunities to promote professional growth and changes in teaching practices. They may enable teachers to incorporate innovative resources and perspectives, to gain new insights about reform initiatives, to engage in reflective processes about their working conditions at schools, and to cultivate their professional identities, among others (Lasky, 2005; Lambirth, Cabral and McDonald, 2019). Over the last decades, multiple studies pointed to essential features of fruitful teacher-education initiatives that nurture professional development: reflective conversations that lead to a deeper comprehension of subject matter, teachers' collaboration in learning communities, opportunities for analyzing students' work, practitioner research, and the development of an inquiry stance, etc. (Cochran-Smith and Lytle, 1999; Kieran, Krainer and Shaughnessi, 2013; White *et al.*, 2013; Strahan, 2016).

Nonetheless, several authors underline that introducing transformations in educational practices is a slow, hard to achieve, and uncertainty-ridden process that involves reconceptualizing what it means to teach as well as identity renegotiation processes (Chronaki and Matos, 2014; Vähäsantanen, 2015; Chapman and An, 2017). Moreover, transforming educational practices also requires complex negotiations with colleagues, students, and the school leadership. Therefore, school contexts can support or constrain transformations in teaching practices fostered by professional development initiatives (Wilkie, 2019).

In this scenario, recent literature draws attention to agency as a key factor in the processes through which change and continuity occur in educational settings (Priestley *et al.*, 2015; Martinie, Kim and Abernathy, 2016; Vähäsantanen *et al.*, 2019). More specifically, agency is understood as an essential dimension of teachers' professional development that supports their autonomy and transformational practice (Eteläpelto, Vähäsantanen and Hökkä, 2015; Oolbekkink-Marchand *et al.*,

2017). In this way, agency is needed to drive the reconstruction of teachers' professional knowledge, identity, and teaching practices.

All the above suggests the relevance of elaborating on professional agency when we analyze the dilemmas teachers confront when trying to connect what they learned during teacher-education initiatives with their teaching at schools. Although several researchers have recently explored teachers' agency in times of reform or at different school contexts, we lack empirical studies that focus on how diverse teacher-education initiatives support teachers in the exercise of their professional agency, empowering them to learn continuously both in the school context and in the training setting. We approach these issues by developing a case study of a primary teacher, Julia,¹ who participated in a specific teacher-education initiative: a professional master's degree (PMD). Our research question is: *How does a teacher, who graduated from a PMD, negotiate new ways of directing her educational practice in the school?* We use the sociocultural perspective proposed by Holland *et al.* (1998) as a theoretical background to conceptualize agency. To understand the processes of negotiation in which Julia was engaged, we carried out a narrative analysis of her oral narratives.

In what follows, we introduce the PMDs for in-service teachers in the Brazilian context before presenting the theoretical perspective on teachers' agency and the study's methodology. This is the backdrop to our presentation of the data and analysis. Next, we discuss our results by contrasting them with the ones obtained by other researchers. Finally, we outline the contributions of our study, delineating implications for university-based teacher-education initiatives.

PROFESSIONAL MASTER'S DEGREES FOR IN-SERVICE TEACHERS IN THE BRAZILIAN CONTEXT

In Brazil, PMDs were established during the first decade of the XXI century as part of a set of public policies driven by the federal government and oriented at expanding and consolidating the research system. Particularly, PMDs were conceived as an opportunity through which universities could contribute to the social and economic development of the country by offering a solid academic education to professionals working in diverse productive sectors (marketplace, public sector, social movements, etc.) (Ribeiro, 2005). Thus, the PMDs' purpose is to train qualified professionals in scientific and technical areas relevant to the productive system, seeking to articulate knowledge, methodological approaches, and their application to the professional field (Brasil, 2009). They are directed at professionals acting in the labor market, promoting opportunities to familiarize themselves with the research process and thus learn how to include the research in their work to add value to their activities (Ribeiro, 2005).

Considering such regulations, the implementation of PMDs in education began in 2009 and was a process permeated by resistance and uncertainty (André and Príncipe, 2017). Those who were opposed to the establishment of PMDs argued that they threatened the huge efforts made during the previous decades to train highly qualified researchers through academic master's degrees and PhD programs (Severino, 2006). On the other hand, PMDs were opportunities for universities to reinforce their commitment with teachers' professional development and qualifications (Campos and Guérios, 2017).

It is important to highlight that the National Education Law (Brasil, 1996), approved in 1996, mandates that teachers need to complete their pre-service education at universities. Within this framework, the National Education Plan set the goal of ensuring that all the teachers hold an

1 The research project was approved by the Ethics Committee of the State University of Campinas. Project's Certificate of Presentation for Ethical Appreciation — CAAE No. 68159717.1.0000.5404. All the names cited in this research project are pseudonymous.

undergraduate degree by 2015. In this way, completing a postgraduate degree is not a requirement to become a teacher in Brazil as it is, for example, in Europe. However, for many Brazilian teachers, these programs are opportunities for career advancement, giving them the right to an increase in wages and better chances of being hired by prestigious schools.

Gradually over the years, PMDs gained legitimacy to the point that, nowadays, more than 150 programs directed at in-service teachers are spread all over the country. Through such programs, the university reaches trainees with a particular profile (Neres, Nogueira and Brito, 2014). Since they are in-service teachers, PMDs are part-time programs, concentrating the workload on one or two days a week in the evenings or at weekends. They are 2-year programs in which credits are divided between taught courses and a master's thesis. In general, subjects focus on diverse educational topics and research methodology issues. It is expected that, in the thesis, the teacher will employ his/her studies to deal with a particular problem of his/her professional practice.

Institutions have large autonomy in defining the content and structure of the curriculum, resulting in quite different PMDs (Losano and Fiorentini, 2018a). Therefore, they support diverse views about what type of knowledge teachers need to improve their practice. There are PMDs focused mainly on providing content knowledge (Caldatto, Pavanello and Fiorentini, 2016; Farias and Vilela, 2017; Caldatto, Martins and Yanez, 2023), while others favor a critical reflection about teaching practice based on research results (Martins and Ribeiro, 2013; Pires and Igliori, 2013).

Besides, PMDs establish different levels of articulation between the activities organized by the program — especially the ones related to the development of the thesis — and teachers' work at schools. In some PMDs, the master's thesis is an opportunity for teachers to engage *with* research (Woore, Mutton and Molway, 2020), interpreting published research relevant to their teaching and implementing classroom activities inspired by such results. In other programs, the thesis is an opportunity for teachers to engage *in* research, becoming active participants in addressing problematic issues of their practice and developing school-based research processes (André and Príncipe, 2017; Silva, 2017).

As has been the case in other contexts, PMDs have brought new elements to the debates concerning the role of universities in the preparation of teachers in Brazil. On the one hand, PMDs reinforced the university's commitment to upgrading teachers' qualifications through post-graduate programs that enhance their autonomy and professionalization (Campos and Guérios, 2017). Hence, these programs can be important bridges between the world of research at universities and the world of teaching practice at schools (Sousa, 2014; Cunha and Agranionih, 2017; Fialho and Hetkowski, 2017). Postgraduate studies may strengthen communication and collaboration between researchers and practitioners, provide teachers with a critical stance toward their teaching and schools, and help to develop in-depth knowledge about teaching and learning, widening teachers' repertoires (Ion and Iucu, 2016; Snoek *et al.*, 2018; Losano and Fiorentini, 2021).

On the other hand, the literature suggests that promoting a genuine dialog between the PMD and the school community remains a challenging issue (Cevallos and Passos, 2012). Teachers frequently experience a lack of support from their colleagues and the leadership to introduce innovations inspired by the PMDs. Therefore, the impacts of post-graduate studies occur at a small scale and are mainly the result of the actions of the teachers themselves in classrooms (Ion and Iucu, 2016). Furthermore, PMDs focused on introducing content knowledge without considering its coordination with the school context risk being ineffective (Losano and Fiorentini, 2020).

The PMD considered in this article — here called MPEduc — privileged teachers' engagement *in* research. We employ the notion of agency as a theoretical lens to analyze how Julia introduced transformations in her educational practices drawing on her participation in such PMD.

THEORETICAL PERSPECTIVE

Over the last decades, there has been a growing interest in researching and theorizing agency in general, and teachers' agency, in particular. As a result, the concept became widely employed in learning and educational research (Vähäsantanen *et al.*, 2019). Teachers' agency has been largely investigated in the context of educational reform and new accountability regimes (e.g. Priestley *et al.*, 2015; Vähäsantanen, 2015). In this article, we explore a rather different context, one in which a primary teacher, by her own volition, decided to participate in a teacher-education initiative that encourages educational change.

In turn, some authors employed the notion of agency to analyze teachers' experiences during different professional development initiatives such as learning rounds (Philpott and Oates, 2017), teacher study groups (Masuda, 2010), self-guided professional development initiatives (Strahan, 2016), among others. Our research context shares some similarities with those studies. Nonetheless, it also has its particularities that enable us to contribute to the field. Concretely, the fact that PMDs are postgraduate programs gives them specific characteristics (an established organization and curricular structure, fixed starting and ending points, etc.). Given the growth of PMDs in Brazil, as well as the important role of postgraduate programs in teacher preparation all over the world, they are significant contexts to be examined.

Since PMDs are not school-based initiatives — as the ones explored by several authors — it is especially relevant to analyze how teachers connect the school world with academia to foster educational changes. For this reason, our focus is somewhat different from the one adopted by other researchers. We pay special attention to the educational practices Julia developed in her classroom drawing on her participation in the MPEduc. Therefore, we employ the notion of agency to examine how she recovered and rearranged resources coming from the PMD to conceive and direct her practice as well as to negotiate new possible actions inside the school.

Considering our research question, we adopted the perspective proposed by Holland *et al.* (1998), rooted in sociocultural theories. The authors assume that people, as participants in social, cultural, and historical worlds, are circumscribed by material and social conditions. However, through their daily activities, they also remake and reframe these conditions. Thus, when teachers participate in daily school activities, many of their actions are framed and mediated by the material and social conditions of their schools; nevertheless, they are also agents that construct and reconstruct such conditions.

Holland *et al.* (1998) proposed the notion of *figured worlds* as a theoretical tool for conceptualizing social and cultural contexts. Figured worlds are realms of interpretation and performance, socially and culturally constructed. They offer a set of roles and positions, assign importance to specific facts and activities, and appreciate some results more than others. Over time, they also create and legitimate their own resources. From this perspective, a school can be understood as a figured world: to participate in this world involves learning the meaning of particular actions, understanding what behaviors are considered adequate, being aware of the values a member should hold, and developing identifications with its practices (Losano, Fiorentini and Villarreal, 2018). A professional master's degree can also be understood as a figured world. It has participants positioned differently — master's student, teacher educator, supervisor, etc. — that engage in specific activities and produce relevant resources for teacher education (Losano and Fiorentini, 2018b). Such figured worlds provide the meaning contexts and the resources employed in their participants' actions and disputes; thus, they shape the teachers' agency.

Figured worlds are continuously (re)created by their participants. Therefore, they are not exempted from disruptions: "When individuals learn about figured worlds and come, in some sense, to identify themselves in those worlds, their participation may include reactions to the treatment

they have received as occupants of the positions figured by the worlds” (Holland *et al.*, 1998, p. 143). Besides, specific practices, especially the ones developed outside the regulated time and space, are occasions in which alternative worlds can be imagined and experienced (Holland *et al.*, 1998). Thus, certain practices, such as the ones offered by a PMD, may be opportunities for teachers to exercise their agency by envisioning new worlds related to teaching and learning. They allow the co-development of alternative worlds, cultural forms, identities, and agencies.

From such a sociocultural perspective, agency refers to:

the realized capacity of people to act upon their world and not only to know about [...] it. That capacity is the power of people to act purposively and reflectively [...] to reiterate and remake the world in which they live, in circumstances where they may consider different courses of action possible and desirable. (Holland *et al.*, 1998, p. 42)

On this basis, we conceptualize professional agency as a teacher’s intentional and active involvement in conceiving and directing her/his teaching practice² according to her/his own purposes, principles, and interests, as well as to the requirements and possibilities set by the school context.

According to Holland *et al.* (1998), agency comes through improvisational responses to social and cultural openings and impositions. As participants in the figured world of teaching in school, teachers are daily confronted with unexpected and problematic situations. Teachers become agents in this world by arranging and piecing together cultural resources in opportunistic ways to address such problems. These improvisational responses involve using cultural resources in innovative ways. Improvisations are produced from past experiences, using the cultural resources available, and in response to the subject positions afforded in the present.

From this perspective, some forms of organized activities may be collective opportunities for people envisioning, improvising, and experiencing changes in the figured worlds they are participating in. For instance, Holland *et al.* (1998) describe the *Tij* Festival in Nepal as an opportunity for women “to envision a world where women were powerful and educated, equal to men” (p. 267). Despite the importance of these opportunities for expanding and exercising collective agency, in this article we focus on a teacher’s individual agency. This is so due, mainly, to our research question.

On these bases, agency is exercised at present, informed by past experiences or influences, and oriented toward the future (Vähäsantanen, 2015). Thus, “each decision teachers make, each action they take is simultaneously a consequence of past action and present context and a condition shaping the context for further action” (Lasky, 2005, p. 900). In this way, professional agency results from the interplay of a teacher’s efforts, available resources, and contextual and structural factors as they come together in a particular and, in a sense, always unique situation (Oliveira and Cyrino, 2011; Priestley *et al.*, 2015).

From this perspective, the analysis of professional agency should consider the actions and choices teachers produce to respond to problematic situations, as well as the resources they arrange to perform such actions and choices. It should also consider the role played by other members of the figured world of teaching in the school in the legitimation and preservation of certain practices.

The notion of figured world combined with the conceptualization of professional agency provided us with a complex and rich theoretical lens through which to analyze the ways Julia introduced transformations in her educational practices drawing from her participation in the MPEduc and how she confronted the tensions emerging from such changes. The notion of figured world enables us

² Teaching practice encompasses a teacher’s repertoire of professional actions linked to teaching. It comprises pedagogical approaches and actions inside the classroom, as well as activities outside the classroom, such as lesson planning, assessment or reflection actions, and staff meetings, among others.

to conceptualize the school context and the PMD and the relationships the teacher may establish between them. The notion of agency allows us to analyze the opportunistic and creative ways in which the teacher combines cultural resources — coming from these two figured worlds — to craft new solutions to problematic situations.

RESEARCH METHODOLOGY

This study is part of a research project seeking to understand how participation in PMDs contributes to the development of teachers’ professional identity and encourages educational change. The project involved four teachers who graduated from four different PMDs offered in the State of São Paulo. In this paper, we develop an interpretative case study (Yin, 2009) centered on Julia Gomez, a primary teacher with 18 years of experience. Although Julia taught all the subjects included in the curriculum, we focused on her experiences teaching mathematics. We selected Julia since she was the only participant that revealed to us that, after graduation, she continued implementing in her classroom the mathematical tasks she designed during the development of her master’s thesis. Therefore, this case seemed particularly fruitful to analyze the process of introducing sustainable educational change.

The data come from varying moments and places, encompassing Julia’s experiences before, during, and after she participated in the MPEduc (see Table 1). Considering our research question, the interview was our primary source. The other data provided background information and were employed to describe Julia’s professional trajectory. All the data was collected in Portuguese, Julia’s mother tongue.

Table 1 – Data collected.

Source	Description
MPEduc official documents	Internal regulations, enrolment documents, web page, and master’s theses defended during the period 2014–2016.
Master’s thesis	Account of the process of designing, implementing, and analyzing classroom tasks focused on the number system.
On-line questionnaire	Teaching experiences before and after graduation from the MPEduc. Motivations and expectations for enrolling in the program. Difficulties experienced.
Recorded interview	Julia’s teaching practice at present. Contributions of the MPEduc to her professional development and practice.
Follow-up interview via email	Established ways of teaching the number system in Julia’s school. Reactions of the leadership and colleagues to her teaching proposal.

Source: the authors (2018).

The interview was of the narrative type (Riessman, 2008). Julia was encouraged to talk openly about herself, her teaching practice, school, and experiences during and after MPEduc. Both the interview and the follow-up interview were conducted by the first author of this paper. The interview was conducted by the first author in Portuguese.

We developed a narrative analysis (Riessman, 2008). Two reasons supported this decision. Firstly, our data had a narrative nature since, during the interview, Julia selected, organized, and connected events she considered meaningful. Secondly, narratives are event-centered and depict human action. Thus, agency manifests itself in the stories in which the teachers recall having adopted

their point of view, as well as in the ones in which they remember having adapted themselves to imposed practices.

To analyze the data, we broke down our general research question into the following specific questions: How did Julia:

- recover, reframe, and arrange resources from diverse figured worlds related to mathematics teaching — past or present resources — to conceive and direct her teaching practice?
- act upon the social world of teaching and negotiate — with others — new possible actions inside this world?

The analysis was developed in two stages. Firstly, we transcribed the interview (see Appendix for a description of the conventions employed) and searched for narrative episodes in which Julia negotiated new ways of directing her teaching practice drawing from her participation in the MPEduc. As a result, we identified four episodes.

Secondly, we developed a performative narrative analysis of each episode (Riessman, 2008). Such analysis considers what is said in a narrative, as well as how the narrator chose to plot the events and the accents and tones she employed (Kaasila, 2007). We began by studying how Julia structured each episode. To this end, we identified scenes focused on a topic, event, and/or time inside each episode. This process also enabled us to identify comments that functioned as a recurrent refrain in Julia's speech. We called such comments *Coda*. Next, we analyzed the participants' positioning, the setting, the enactment of dialogues between the story's participants (reported speech), repetitions, paralinguistic features — pauses and laughs —, and the audience the teller is addressing. All these analytical procedures were conducted with the data in its original language, Portuguese. Finally, we carefully translated the episodes and our analysis to English. Acknowledging that translation, as transcription, involves complex interpretative decisions, we decided to be in charge of this process — two of us are fluent in this language — instead of hiring a professional translator. Besides, we consulted English native speakers about how to translate specific sentences.

RESEARCH CONTEXT AND PARTICIPANT

THE MPEDUC

Established in 2014, the MPEduc is a two-year program offered by a public university and oriented at in-service primary or secondary teachers. The program goals are:

- To develop a partnership between the school and the university, considering the school as a *locus* of knowledge production and teacher education.
- To contribute to teachers' professional development, considered as a process that occurs throughout their professional careers.
- To promote actions that enable teachers to become teacher-researchers, by assuming an investigative stance.
- To promote investigative actions that enable teachers to reflect on the development of interdisciplinary approaches (MPEduc Internal regulation).

Thus, it is an educational context concerned with developing approximations and convergences with the figured world of teaching at the school. It promotes opportunities in which teachers systematically reflect on their practices, making explicit the principles that underpin their actions and considering the affordances and constraints of their schools. The program's credits are divided between the courses and master's thesis. The courses are divided into mandatory ones (two called *Educational Research Methodology* and *Theoretical-methodological Foundations of*

Education) and electives (four subjects). In the MPEduc, the master’s theses are rooted in issues teachers confront when teaching specific topics. The thesis involves planning and implementing classroom tasks based on the pedagogical perspectives introduced during the program, as well as developing an analysis of the whole process.

RESEARCH PARTICIPANT

In 2000, Julia graduated from a four-year program for primary teachers and was hired by a private school. A few years after graduation, she enrolled in a four-year mathematics program for secondary teachers and graduated in 2008. In the same year, Julia also began to work in a public primary school in the State of São Paulo. In 2013, Julia was recruited as a teacher educator in a program called *National Pact for Achieving Literacy at the Right Age*³ (PNAIC). Julia returned to university in 2014 when she enrolled in the MPEduc.

The main aim of Julia’s thesis was to analyze how her 1st-grade students learned about the number system. Julia’s concerns about this topic date back to her first year of teaching. At that time, she perceived the students struggled with associating a certain quantity — that represented the cardinal of a set — to the corresponding numeral. These experiences inspired Julia to focus her final monograph on the mathematics program on this issue. Years later, when she was a participant in the MPEduc, this issue was far from being solved in her teaching practice. Based on the cultural-historical theory, Julia planned, implemented in her classroom, and analyzed three tasks. The first one focused on one-to-one correspondence. The task presented the story of Murílio,

a boy who, without knowing how to write or read, began working at Bernardo’s farm taking care of the horses. Every morning, Murílio had to take the horses to the meadow. In the afternoon, he had to bring them back to the stable without losing any. In the beginning, there were only a few horses on the farm. Thus, it was easy to observe if one of them was missing. But one day, Bernardo bought many horses making it difficult for Murílio to know how many horses returned (Julia’s thesis).

The students were asked to help Murílio, suggesting ways of counting the horses using available resources (e.g., stones). The second task focused on one-to-two and one-to-ten correspondence, and the third task, on place value.

Julia’s teaching proposal contrasted with two practices established at the school. The first one focuses on “repetition”, that is, on requesting the students “to write the same numeral several times over many lines in their notebooks until they memorize it” (follow-up interview). The second practice was imposed by the leadership and involved memorizing the number sequence: “Every day we must write on the blackboard, and the students must write on their notebooks a number sequence. At the beginning of the year, we write the numbers from 1 to 10. At the end of the year, we must reach 50 or more” (follow-up interview). In this context, Julia’s teaching proposal was received with skepticism by the leadership whose members “doubted about the results” (follow-up interview). Nevertheless, they authorized her to implement the tasks. At that time, Julia also discussed her proposal with some colleagues. However, “since it required some effort and study, I couldn’t make much progress with them” (follow-up interview).

Julia graduated from the MPEduc in 2016. She worked as a teacher educator in the PNAIC until 2018. Currently, she continues working as a teacher at the same public school.

3 The goal of this pact was assuring that all children achieve literacy until age eight. It offered in-service teacher-education opportunities to support teachers in developing students’ literacy.

DATA AND ANALYSIS

In this section we present the data corresponding to the four selected episodes, followed by the narrative analysis of each one.

EPISODE 1: “EVERYTHING BEGAN TO MAKE SENSE IN MY HEAD”

At the beginning of the interview, we asked Julia about her motivations for enrolling in the MPEduc. On this occasion, Julia narrated the episode transcribed in Table 2.

Table 2 – Episode 1.

	L: When you filled out the online questionnaire, you responded that your motivation was to find new knowledge for improving your lessons. Can you explain to me what you mean?
Scene 1	
1	Yes! Because although I had already focused the final monograph [of the mathematics program] on the number system, I was not happy about the things I was doing.
2	I believed that something was missing.
3	So, I decided to focus [the thesis] on the same issue.
4	That was an issue that motivated me.
5	Not all the things [mentioned in the final monograph] were working out [...]
6	In my master’s thesis, I was able to have a conversation. [I thought] What would I improve now?
Scene 2	
7	[...] When I read books to write the thesis’ theoretical framework, it was like this:
8	I proposed a task in the classroom and saw the students’ answers and actions .
9	And it was like: “Oh! That author said exactly that! ”
10	Everything began to make sense in my head.
11	The things that didn’t make sense began to make sense because I started to relate the things I was reading with my students’ actions [...]
12	It began to make sense in my head.
13	So, in my opinion, my lessons became more meaningful.

Source: the authors (2018).

In this narrative episode, Julia highlighted the relevance of writing her master’s thesis to achieve the goal that motivated her to enroll in the MPEduc: to acquire knowledge for improving her lessons.

The episode brings to the fore the multiplicity of resources Julia gathered when writing her thesis. She began mentioning the practices related to teaching the number system she experienced during the mathematics program (Scene 1). Julia brought to her speech such resources coming from her past and reflected on them considering her current practice: despite the opportunities she already had to study about teaching the number system, this issue still challenged and intrigued her (lines 1, 2, and 4). Then, Julia underlined that such resources did not remain unchanged; they had to be reframed and reshaped since not all of them “were working out”. Taking charge of the decisions

concerning what aspects of her practice she will improve, Julia positioned herself as the main agent in this process (line 6).

In scene 2, Julia brought to her speech the resources coming from the MPEduc. She underlined the importance of establishing substantive links between her students’ actions and the theoretical perspectives she was studying (lines 8 and 9). When such links were established, Julia’s teaching practice gained new meanings, and the theoretical perspectives became useful. She underlined this fact by repeating — in lines 10 and 12 — the idea that “things begin to make sense”. Through this process, the theoretical perspective became part of the principles underpinning the teacher’s actions and choices.

According to our analysis, this episode reveals that Julia experienced the master’s thesis as an opportunity to exercise her professional agency by arranging and piecing together cultural resources coming from her past and from the MPEduc to address a recurrent problematic issue of her current practice: teaching the number system to her students.

EPISODE 2: “I BELIEVE IN THE WORK I DO ON THE OUTSIDE!”

When we proposed to Julia to speak about her teaching after she graduated from the MPEduc, she narrated a long episode. There, the teacher recalls the experiences when she implemented the classroom tasks she designed for her master’s thesis during the two years after her graduation (see Table 3).

Table 3 – Episode 2.

	Scene 1
1	And last year, I said:
2	“If I had developed my thesis last year, the results would have been different”.
3	I would have been able to get much further because my class was... It was fantastic [...] it was wonderful !
4	And I worked again with the story [she refers to Murílio’s story], and I clearly recognized knowledge construction as a historical process.
5	How men did it anciently, during history, and how my students constructed it.
6	They suggested using a tree trunk to count the horses [making a notch for each one].
7	So, I brought a piece of tree trunk into the classroom!
8	They suggested it, so let’s do it!
9	Everybody thought it was crazy that I carried a piece of tree trunk, but I did it.
10	And they [her students] were engaged and... the results were great because the parents came to the school and asked me:
11	“What are you working on right now? What are you doing?”
12	And I told them that it was my teaching proposal, and they told me:
13	“All of them [the students] are going to be mathematicians! It’s incredible! Their eyes light up when they speak about the story [of Murílio]!”
14	They really engaged with the story. That was great!

Continue...

Table 3 – Continuation.

	Coda
15	So, it is not because I have already finished my thesis that I'll stop. That I won't do it anymore.
16	I continued working on that.
	Scene 2
17	This school year, I started that work again.
18	The experience is completely different from last year and 2016 because my class is different.
19	They don't understand the one-to-one correspondence yet.
20	They are not there yet.
21	So, I'm going. I'm guiding them.
22	I'm not giving the answers.
	Coda
23	So, I think it wasn't only a thesis I wrote to get a diploma.
24	I'm still implementing the proposal and working inside the classroom.
	Scene 3
25	My former students are now in 2 nd grade.
26	Their teachers look for me and say:
27	[Interpreting her colleague] "What a pity! When we try to teach something, they say:
28	" <i>Tia</i> * Julia already taught us that!"
29	[Interpreting her colleague] "I propose that they solve a problem [they say:]"
30	[Interpreting her former students] "Oh! To solve this problem, I don't need to think. I just have to solve it."
31	I proposed to the students to solve problems in which they really had to think.
32	[Interpreting her former students] "Oh! But <i>Tia</i> Julia did it differently!" ((laugh)).
	Scene 4
33	And because of all this work, the Federal Institute of Araraquara invited me.
34	They wanted to know how I taught my 1st-grade students.
35	They asked me: "Do you teach by repetition?"
36	No, it is not by repetition.
37	As I already said: Must I write on the blackboard? I write.
38	Is that what the school wants? I obey.
39	But do I believe in what I'm writing? No!
40	I believe in the work I do on the outside! ((laugh))

*The word 'tia' ('aunt' in Portuguese) is commonly used by students and parents to refer to teachers in Brazil.
Source: the authors (2018).

Julia constructed a chronologically structured narrative to describe how she transformed her teaching practice by drawing from her experiences at the MPEduc. She put together events happening in different settings — her classroom, the 2nd-grade classroom, the school, and the Federal Institute — in which diverse actors participated.

Scene 1 focuses on Julia's experiences when she reimplemented the teaching proposal designed on the occasion of her master's thesis the year after her graduation. Julia introduced her students and positioned them as special ones (line 3). At this opportunity, Julia reinforced one of the ideas underpinning her thesis: a suitable approach for teaching the number system is to propose classroom tasks inspired by the situations humanity historically went through (lines 4 and 5). Julia and her students are the protagonists of this scene. They imagined ingenious ways to help Murílio to count the horses, and Julia responded accordingly (lines 6 to 8). In line 9, Julia highlighted that some of her actions surprised her colleagues. However, Julia exercised her agency, ignoring such opinions and embracing her students' ideas. At this point of the scene, Julia employed reported speech to introduce the voices of other relevant participants of the figured world of teaching at the school: the parents (lines 11 to 13). In doing so, Julia built credibility and pulled her audience into the narrated moment. This linguistic resource also allowed Julia to communicate an important message about herself and her work. By appropriating the parents' voices, Julia can claim that the tasks she designed were valued and legitimated mainly because of the enthusiasm they inspired in the students. Thus, the parents were participants in the figured world of teaching at the school with whom Julia successfully negotiated new actions and practices.

In scene 2, Julia narrated the experiences she was having with her class. She emphasized that the implementation of the teaching proposal was not a mere reproduction (line 18). That specific class had a particular pace and confronted specific difficulties. Therefore, Julia adapted her teaching practice and developed specific actions to attend the needs of this class (lines 21 and 22).

Julia ended scenes 1 and 2 with a Coda through which she conveyed a central claim: years after graduation, Julia continuously recovered and reframed the practices and discourses reified in her master's thesis to direct and assess her way of teaching the number system in the figured world of the school.

According to our analysis, scenes 1 and 2 reveal Julia's professional agency. In each one of them, she is an agent acting inside her school and responding to the emergent situations in this figured world. Implementing her proposal year after year, Julia and her students created an atmosphere where alternative worlds related to teaching and learning mathematics were created and experienced.

The last scenes are centered on two impacts of Julia's teaching practice over time. Scene 3 is situated in the figured world of teaching at the school. The characters are 2nd-grade teachers in charge of Julia's former 1st-grade students. She used reported speech to reproduce conversations she had previously had with her colleagues (lines 27 to 33). Julia outlined that, in her classroom, students were positioned as active participants and understood themselves as successful mathematics learners (line 31). When introducing her colleagues' voices, Julia stressed that such an experience is not easily reverted. Thus, her former students resisted being passively positioned and did not engage with scarcely challenging problems. In Julia's speech, her colleagues do not seem to find ways of coping with these students. Her laugh at the end of the scene underlines that her colleagues were participants of the figured world of the school with whom the negotiation of new actions was not simple.

The second impact of Julia's teaching practice took place in a new setting, a Federal Institute, whose participants valued her teaching approach (scene 5). She used reported speech once again, recalling a dialogue she had had with the teachers of this institution in which she contrasted her

teaching proposal with the approach centered on repeating the number sequence (lines 35 to 40). This comment enabled her to convey the practices imposed by the school leadership regarding the number system. By introducing in her speech questions, she rapidly and concisely responds (lines 37 and 38), Julia positioned herself: although she not agreed with such impositions, she could not completely ignore them. Her speech highlighted the superficial nature of her obedience. However, she exercised her agency, acting “on the outside” of the imposed practices. In this way, Julia chose to offer her students a parallel learning trajectory organized around the classroom tasks she created during the MPEduc. Her words “on the outside” followed by laughs expressed the marginal and subversive nature of the teaching practices she chooses to develop.

It is important to highlight that the first implementation of her classroom proposal was the starting point of long and laborious negotiations with the school leadership that extended over three years, as Julia narrated: “After many conversations and [official] assessment, they ended up convincing themselves of my work. They set me free to implement the proposal if I also followed the official teaching approach” (follow-up interview). Therefore, over time Julia’s teaching proposal gained some legitimacy inside the figured world of teaching at her school. Nevertheless, such a process did not involve abandoning the teaching practices established at school: Julia was given the freedom to implement her proposal — and, therefore, conceiving and directing her teaching according to her own purposes and intentions — provided that she also developed tasks that subscribe to the mandatory teaching approach.

This narrative episode reveals how Julia strategically improvised actions from the possibilities and constraints set by her school. According to our analysis, Julia’s speech brought to the forefront the gap she found and cultivated throughout the years to act upon her teaching practice according to her intentions and principles inside a figured world reluctant to change.

EPISODE 3: “WHEN WE LEARN SOMETHING, WE CAN’T CONTINUE DOING THINGS IN WAYS WE KNOW THAT ARE WRONG.”

During the interview, when we asked Julia if some of the MPEduc subjects produced transformations in her teaching practice, she narrated the following episode (see Table 4).

With these words, questions, and silences, Julia narrated how some ideas from the figured world of the MPEduc became resources to conceive and direct her teaching practice. In scene 1, Julia initially described the contributions of the course *Reflexive Practices in Education*. She brought to her speech a discourse she valued: Julia cannot orient her teaching based on ideas she considers unproductive or ineffective (line 4). Thus, the subject was an opportunity to reflect on her actions and choices when teaching. By introducing dialogs she had with herself, Julia recovered discourses from the subject to assess *in situ* her choices and actions inside the classroom (line 5).

Julia devoted the rest of the narrative to producing an answer to Leticia’s question. In the beginning, she vaguely described the transformations in her teaching, mentioning having changed some of her attitudes and actions without many details (lines 7 and 8). After a pause, Julia constructed an example that materialized such ideas.

Thus, Julia began scene 2 describing a restriction in her teaching: it is necessary to implement some of the tasks proposed by the mathematics textbook. In using the pronoun “we” on line 9, Julia underlined that such restriction is shared with the rest of the teachers at her school. At this point, Julia moved back to the past, remembering how she used to deal with such imposition: she proposed some of the textbook tasks mainly to show others that she fulfilled the requirement (lines 10 and 11). In this way, it seemed that other participants of this figured world — probably members of the school leadership — guided some aspects of Julia’s teaching. Next, she contrasted the position she assumed in the past and the one she began to assume during the course. Through

Table 4 – Episode 3.

Scene 1	
1	I think Reflexive Practices [she refers to an elective course called <i>Reflexive Practices in Education</i>].
2	That one helped me.
3	Because we begin to..., as I always said
4	When we learn something, we can't continue doing things in ways we know don't work. That are wrong.
5	You think: "Oops! What am I doing in the classroom? I can't, I can't do it like that anymore".
6	So, I changed some things after that course.
	<i>L: Can you describe the things you changed?</i>
7	Some of my attitudes inside the classroom, things regarding the students..., that involved a reflection about my practice.
8	Some things I used to do, for example...
Scene 2	
9	We must solve some of the mathematics textbook tasks. Isn't it?
10	I used to propose the tasks like: "OK, I'll do it, and that's it!"
11	Just to say that I'm doing it.
12	No! Since we have textbooks, why not try to get some benefits from this task?
13	Let's think about this task!
14	The task is formulated in that way in the textbook, but I can make changes without abandoning the textbook.
15	So, you begin to think about that kind of thing.

Source: the authors (2018).

a dialog with herself, Julia projected new ways of conceiving and directing her teaching (lines 12 to 14). Therefore, the reflections developed during the course become relevant resources for Julia's agency. Although the restriction related to the textbook tasks is still present in the figured world of teaching at the school, Julia positioned herself differently towards it. She assumed a position in which she acted upon the textbook, making choices and adapting the tasks to serve to her own purposes and interests.

We consider this narrative episode an example of how some resources from the MPEduc contributed to transforming Julia's teaching practice. The course *Reflexive Practices in Education* offered opportunities in which she imagined and projected herself in social scenes different from the ones frequently developed inside the figured world of the school. Through this process, she became an agent in the transformation of her teaching practice.

EPISODE 4: "I BEGAN NOT TO SEPARATE THEORY FROM PRACTICE."

At the end of our interview, we asked Julia if and how the development of her master's thesis changed her role as a teacher. To answer our question, Julia produced a narrative episode that, on the one side, reinforced some of the ideas she already had expressed and, on the other side, revealed other contributions of her participation in the MPEduc (see Table 5).

Table 5 – Episode 4.

Scene 1	
1	My thesis contributed to my teaching practice because I began not to separate theory from practice.
2	At the beginning of my career, during the undergraduate program, the theory was there, but the things I taught in the classroom were on another level.
3	I never made a relation [between them].
4	Even today, we hear people saying: “Oh! That crowd from the university! They study a lot but don’t come into the classroom to really know how things are!”
5	I think the professional master’s degree has this special feature, because the teacher must be [teaching] in the classroom. He is there.
6	So, you cannot say: “People at the universities say something, but they are not inside the classroom to understand what really happens there”.
7	That was not my case.
8	I was studying at the university and I was inside the classroom, in contact with the school’s problems.
9	I was there, and I made it. So, it’s not an impossible thing to do.
10	You are able to make the links between theory and practice.
Coda	
11	So far, that’s what I’m trying to do. Isn’t it?
12	To build a link between theory and practice inside the classroom.
13	Even after I graduated.
14	Because it was not like: “That’s it, I finished, I got my diploma, now I’m not going to do anything more”.

Source: the authors (2018).

In this episode, Julia highlighted one of the main contributions of her master’s thesis: it was an opportunity to build profound relations between the theory studied in the figured world of the MPEduc and her teaching practice. Julia reverted to the past, remembering experiences in which she could not retrieve resources from her pre-service education to conceive and direct her teaching practice (lines 2 and 3). At that time, the “theory” seemed to exist in the figured world of the university, a world completely detached from the school. Julia stressed such separation — and, therefore, the failure of the resources produced inside the university to direct teaching practice — by introducing the voices of other participants of the figured world of teaching at the school. Such voices claimed that university teachers “study” and “speak” about how to teach, but such orientations are disconnected from the complexity of classroom realities (line 4). The MPEduc, with its specific characteristic, enabled Julia to position herself differently: she became a member of both figured worlds, crossing the boundaries between them. In repeatedly using the pronoun “I” (lines 8 and 9), Julia highlighted that she was the protagonist who linked practices fostered by the MPEduc and the ones related to the school reality. She underlined that, although not simple nor usual, such a process is not “impossible” to undertake.

Julia ended the episode with a Coda in which she summarized the main ideas she was trying to convey. Firstly, the theory became a resource for conceiving and directing Julia’s choices and actions inside the classroom. Thus, the construction of links between theory and practice became a resource for exercising her professional agency. Secondly, she remained engaged with the practices

and discourses she experienced during her master’s thesis. Throughout this episode, Julia revealed to us how she took up the discourse of “linking theory and practice” — a discourse with which she became familiar during the MPEduc — and used it to orient her teaching.

DISCUSSION

The narrative analysis revealed the complexities of educational change. Considering our general research question, the analysis showed that, during and after graduation from MPEduc, Julia continuously negotiated — with herself and with other participants of her school — new ways of directing her teaching practice in mathematics in a process in which:

- She recovered and pieced together resources from different figured worlds to address problematic situations of her teaching and to assess *in situ* her actions and choices inside the classroom. Through this process, that extended over time, Julia produced a dialectical synthesis linking practices from the MPEduc with the ones from her daily work in the classroom. Thus, Julia re-signified and consolidated the principles that directed her teaching of the number system.
- She reflected about and re-positioned herself in front of some practices established and legitimated inside the figured world of teaching in her school. Resources coming from the MPEduc — different theoretical perspectives and teaching strategies, a new approach to the use of textbooks and the development of a reflective stance toward teaching practice — played a central role in this process of unsettling prevailing practices. Thus, Julia managed to interpret such practices as only *one* view, not the only view — and not even the most appropriate (Nolan, 2016).
- She strategically created opportunities for acting upon the figured world of teaching, reframing some of the school impositions as opportunities to enact her agency. Although she had to adapt to some practices imposed by the school leadership, Julia sought and cultivated gaps — “on the outside” of the established teaching approach — to propose classroom tasks based on the studies and inquiries she engaged with during the master’s degree.
- She built closer and fruitful relationships with her students and their parents while she remained distant — and to some point isolated — from her colleagues who were not interested in her teaching approach.
- She carefully negotiated with the members of the school leadership the tensions emerging from the differences between her teaching approach and the one adopted by the school.

Through an experience that began during the MPEduc — which also recovered part of Julia’s past — and that was created and recreated year after year, the teacher and her students produced a new world related to teaching and learning mathematics. They became social agents capable of producing scenes different from the ones traditionally developed inside the school and vindicating certain positions inside the figured world of teaching at the school. In this sense, Julia’s case shows that sustainable educational change involves the co-development of teachers, students, social positions, practices and artifacts, and senses of agency inside the figured world of teaching in the school.

Our study also indicates that teachers’ agency involves strategic improvisation with available resources and within the range of possible choices and positions in the school context. Thus, the changes Julia introduced were the ones that enabled her to reach a fragile balance between her own purposes and interests in teaching mathematics and the teaching approaches embraced by the school. In line with Priestley *et al.* (2015), Julia’s case highlights the importance of the sociocultural context in the exercise of teachers’ agency: mathematics teachers *act by* means of the figured worlds in which they participate and not only *in* such figured worlds.

Our analysis also showed that Julia's room for maneuver varied according to the different settings inside the figured world of teaching in the school. In the same direction, Eteläpelto, Vähäsantanen and Hökkä (2015) found that professional agency is differently practiced within the school and the classroom context. Although her colleagues and the school leadership did not demonstrate much interest in adopting Julia's approach, inside the school, her proposal for teaching the number system functioned, at least, as a disruptive practice. In this sense, we agree with Nolan (2016), who asserted that: "as soon as agents begin to question and introduce discourses and practices which call into existence other pedagogical possibilities, the potential arises for those dominants and established practices to become replaced by others" (p. 319).

Vähäsantanen (2015), researching a context of educational reform, found that agency involves transformation and maintenance of social practices over time and situations. Julia's case illustrates similar results but in the context of a teacher-education initiative. During the elaboration of her master's thesis, Julia designed and implemented classroom tasks inspired by socio-cultural theory. In this way, the thesis was an opportunity for Julia to conceive her teaching in innovative ways. During the subsequent implementations of the proposal, year after year, and through her negotiations with the school administration, Julia's agency was oriented to maintaining and preserving the way she taught the number system.

CONCLUSIONS

In this study, we analyzed how a teacher, who graduated from a PMD, negotiated new ways of directing her teaching practice in the school. To this end, we used the theoretical lens of professional agency and the notion of figured worlds. Such a theoretical framework allowed us to capture two fundamental aspects of teachers' professional agency. Firstly, its improvisational nature. Agency is oriented at finding or creating gaps inside the figured world of the school in which teachers can develop practices oriented by their own purposes, interests, and principles. Secondly, professional agency is exercised by piecing together resources from different times and spaces.

Regarding our methodological approach, the narrative analysis was effective for exploring, from the teacher's viewpoint, the dilemmas she confronted when she introduced transformations in her teaching. Narrative analysis is a fruitful methodological tool for understanding how teachers can be reflexive and creative and how they are enabled and constrained by their educational contexts.

In highlighting the exercise of professional agency through participation in an in-service teacher-education program, our study offers new perspectives to understand the process of educational change. Such a process is not direct nor simple, and involves intense negotiations inside the figured world of the school. Nevertheless, our analysis highlights some features of the MPEduc that facilitated this process. Thus, our work brings important considerations regarding the organization of PMDs in Brazil, in particular, and university-based teacher education initiatives, in general.

Firstly, it shows the relevance of offering opportunities for teachers to research problematic issues emerging from their practice at schools. Our findings also underline that in-service teacher-education initiatives cannot be organized without considering the complexity of the figured world of teaching in the school. Like Julia, many Brazilian teachers are confronted, every day, with multiple challenges and tensions related to attending the curricular demands, dealing with conservative headmasters worried about the school's results in standardized tests, working with skeptical colleagues, taking care of students coming from vulnerable families, and offering a meaningful (mathematics) education to all of them. Teachers are, first and foremost, participants in this figured world. Inside schools, teachers carry out their daily work, negotiate with others possible actions in line — or not — with the legitimated practices, and face dilemmas and challenges they do not know how to solve. PMDs may be fruitful professional development opportunities for Brazilian teachers when organized around these problems and tensions.

Secondly, our study highlights the importance of allowing opportunities for teachers to build relations between theoretical perspectives about teaching and learning mathematics on the one side, and their actions and their students’ actions inside the classroom on the other side. In doing so, teachers clarify and challenge the principles underpinning their actions and the ones carried out by other participants of the figured world of teaching in the school. Simultaneously, they have the opportunity of imagining teaching practices based on theoretical perspectives. In this way, teacher-education initiatives can be opportunities in which new worlds related to teaching and learning mathematics, new social positions, new cultural forms, and new ways of conceiving and directing the teaching practice develop together.

Thirdly, our findings suggest the significance of allowing teachers to be the protagonists in the production of artifacts to direct their practice. During her participation in the MPEduc, Julia had the freedom to piece together resources from her past, the figured world of teaching at the school, and the PMD itself to design a teaching proposal to confront a problematic issue of her practice. This fact allowed the teacher to gain substantial ownership over the classroom proposal, a central aspect of sustainable educational change.

Hence, our study reveals that, when organized around those three points, PMDs may perform important contributions to teachers’ professional development in Brazil, fulfilling the goals they were created for. When organized around the dilemmas coming from teaching practice, encouraging practice-theory relationships, and enabling teachers’ protagonism, PMDs became opportunities to strengthen communication between researchers and practitioners, to develop a critical stance toward their teaching and schools, and to widen the teachers’ repertoires.

Our case also illustrates some challenging issues concerning in-service teacher-education initiatives in Brazil and other similar contexts. As in many other countries, Brazilian teachers are used to coordinating and planning practical arrangements with their colleagues. However, collaboration — understood as a practice oriented at reflecting on and transforming teaching practice — is not common among colleagues. Since PMDs are programs in which each teacher decides to enroll by him/herself, introducing transformations in teaching practices from participation in such programs can be a solitary endeavor. Thus, a relevant challenge is to imagine ways of engaging the different participants of the figured world of teaching in transforming school practices. Another challenge for teacher-education initiatives is to promote strategies that support teachers in negotiating and collaborating with colleagues and the school leadership. In doing so, such initiatives could contribute to expanding the scope of collective agency at schools.

In summary, our work brings to the forefront the profound and tense interactions between mathematics teachers, the social world of the school where they work, and the social worlds of teacher-education initiatives. In this complex landscape, teachers exercise their agency by searching, creating, and cultivating gaps for introducing transformations in their teaching practices.

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Appendix 1 – Conventions employed during the interview’s transcription.

Transcripts conventions employed	
Symbol	Definition
Bold	Emphasis
“Quotation marks”	Places where the speaker modify her voice, indicating the impersonation of another person in her speech
...	Pause
[explanation]	Explanations inserted by the researcher
(())	Gesture or nonverbal communication