



(Un)Encounters with Teaching: paths trodden by a group of graduates from the licentiate degree in Mathematics at Unimontes (2020-2023)

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ABSTRACT

Background: The academic and professional trajectories of graduates from a licentiate degree make it possible to understand how pathways into teaching are constructed and how perceptions of the profession are shaped in the contemporary context. **Objectives:** To examine the paths followed by a group of seventeen graduates from the licentiate degree in Mathematics at Unimontes, who graduated between 2020 and 2023, focusing on their academic and professional choices, their professional activities, their future perspectives, and their reflections on Basic Education. **Design:** Qualitative research developed based on oral history. **Setting and Participants:** Seventeen graduates of the licentiate degree in Mathematics at Unimontes, who graduated between 2020 and 2023, participated in the study. They were selected through prior contact and acceptance. **Data collection and analysis:** Seventeen graduates from the licentiate degree in Mathematics at Unimontes, who graduated between 2020 and 2023, participated in the study. They were selected through prior contact and voluntary consent. **Results:** The analyses reveal diverse trajectories among the graduates, with some working in teaching and others engaged in or seeking opportunities in different fields. Their choices are influenced by factors such as working conditions, professional recognition, and available opportunities. Teaching in Basic Education is often not envisioned as a long-term career path, and enrollment in *stricto sensu* graduate programs is sought to pursue careers in higher education. **Conclusions:** The study highlights the plurality of paths taken by graduates and points to the need for reflection on teacher education and the conditions for practising the profession, contributing to a better understanding of the relationships between initial teacher education, professional choices, and permanence in teaching.

Keywords: Licentiate degree in Mathematics; Graduates; Academic choices; Professional choices; Oral history.

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(Des)Encontros com a Docência: caminhos trilhados por um grupo de egressos do Curso de Licenciatura em Matemática da Unimontes (2020-2023)

RESUMO

Contexto: As trajetórias acadêmicas e profissionais de egressos de cursos de licenciatura permitem compreender como se constroem os caminhos de inserção na docência e as percepções sobre a profissão no contexto contemporâneo. **Objetivo:** Tematizar os caminhos trilhados por um grupo de dezessete egressos do Curso de Licenciatura em Matemática da Unimontes, graduados no período de 2020 a 2023, suas escolhas acadêmicas e profissionais, suas atuações, suas perspectivas futuras e suas reflexões sobre a Educação Básica. **Design:** Pesquisa qualitativa desenvolvida a partir da História Oral. **Ambiente e participantes:** Participaram do estudo dezessete egressos do Curso de Licenciatura em Matemática da Unimontes, graduados entre 2020 e 2023, selecionados mediante contato prévio e aceite. **Coleta e análise de dados:** Produzidos por meio de entrevistas semiestruturadas, realizadas presencialmente e por plataforma digital, gravadas, transcritas, textualizadas e analisadas a partir das narrativas dos participantes. **Resultados:** As análises evidenciam trajetórias diversas entre os egressos, com parte deles inserida na docência e outros atuando ou buscando oportunidades em áreas distintas, sendo suas escolhas influenciadas por fatores como condições de trabalho, valorização profissional e oportunidades. A atuação na Educação Básica não é vislumbrada, sendo o ingresso em cursos de pós-graduação *stricto sensu* almejados para atuação no Ensino Superior. **Conclusões:** O estudo evidencia a pluralidade de caminhos trilhados pelos egressos e aponta a necessidade de reflexões sobre a formação docente e sobre as condições de exercício da profissão, contribuindo para compreender as relações entre formação inicial, escolhas profissionais e permanência na docência.

Palavras-chave: Curso de Licenciatura em Matemática; Egressos; Escolhas Acadêmicas; Escolhas Profissionais; História Oral.

INTRODUCTORY WORDS

Discussions about teacher education and teachers' professional and academic choices are not recent. However, they are far from exhausted as a debate. In fact, the professional and academic choices of graduates of licentiate courses play an important role in shaping the educational landscape in Brazil and other countries.

The mathematics licentiate degree course at the State University of Montes Claros (Unimontes) has, over the years, been a *locus* of education for prospective teachers in basic education. However, little is known about the paths taken, academic and professional choices, trajectories, and perspectives of graduates of this course regarding their performance in basic education. This *misinformation* is no different for those who graduated between 2020 and 2023.

Thus, the study aimed to thematise the paths followed by a group of seventeen graduates of the mathematics teaching degree course at Unimontes, who graduated from 2020 to 2023, including their academic and professional choices, performances, future perspectives, and reflections on basic education.

In this context, the questions that the research sought to answer are: What factors contributed to or did not contribute to the choice of academic and professional paths of graduates of the mathematics teaching degree course? Did these paths lead them to continue teaching that started during or after their undergrad studies, or, on the contrary, did they choose other areas in the labour market?

Using oral history methodology, we conducted semi-structured interviews with 17 graduates of this course and, through their narratives, sought to identify the convergences and divergences in their trajectories.

Thus, we intend to structure this article into four sections, in addition to the initial and final considerations. In the first section, we discuss the teaching profession in Brazil. In the second, we address memory and history based on the work of researchers on the subject. Subsequently, we present our methodological choice and the path for the (re)construction of the participants' stories and, in the last section, the paths followed by the graduates of the mathematics teaching degree course at Unimontes.

SCENARIO OF THE TEACHING PROFESSION IN BRAZIL

Before *discussing* teaching, we must consider the agent behind it: the teacher. Supported by Pinto, Souza, and Melo (2021), we understand that a teacher is “a professional endowed with knowings and specificities, whose main function is to educate and mediate knowledge with their students and provide both learning and reflections on and in practice”. In other words, they instigate, coordinate, and build knowledge, being critical-reflective of and in their own practices.

The teaching profession has undergone various phases in its development. Vieira (2016) states that it was forged throughout human history, as it is embedded in a social, political, economic, and cultural context. The historical origins of the teachers occurred in religious contexts, where their figure was confused with that of monks and nuns. In the Brazilian context, they were the priests (Jesuits) of the Society of Jesus.

Teacher education in Brazil emerged explicitly from Independence, “when the organisation of popular instruction was considered” (Saviani, 2009,

p. 143). That is, until 1822, there was no concern with educating teachers for the effective exercise of teaching and the constitution of a profession.

Tanuri (2000, p. 63) shows that only from 1827, with the promulgation of the Law of Schools of First Letters, there was the creation of institutions for the education of teachers, with the concern of the state to not only “teach the first letters, but to prepare teachers, instructing them in the domain of the [mutual] method”, without theoretical foundation for this education.

In this scenario of organisation of popular instruction, we highlight the creation of the first Normal School in the country in Niterói, in 1835, an institutional framework that formalised the preparation of teachers for primary education. However, teacher education in undergraduate courses would only gain prominence a century later, with the foundation of the first Faculty of Philosophy, Sciences, and Letters, in 1935.

Studies such as those by Gatti and Barreto (2009) point to the teaching profession as one of learning and constant development. That said, teachers, when situated in their contexts, will also have their professional identities built and modified, as they are continuously formed through experiences, intersubjective relationships, and the environment of their practice.

From this perspective, the process of educating a teacher is shaped by social, economic, and political issues that extend beyond the classrooms of both the university and the school. Thus, it is understood as a formative process full of struggles, tensions, and experiences.

The teaching profession is a focus of constant dispute, identity policies, legitimation or even existentialities, especially in the current situation, in which “the teaching profession has taken increasingly challenging paths, taking into account the policy of breaking up the profession, through the image of the teacher and their role in society” (Rios, 2021, p. 13). Today, these professionals live in constant vigilance and resistance, given the need to continually renew and reinvent themselves.

As Freitas *et al.* (2010, p. 96) indicate, the challenge of being a teacher in school is that several problems are present in this space. Now, “the world is changing so fast, that the teacher has to study not only the content, but the teaching methodology, the psychology to deal with the students, to be demanding and calm at the same time”. In this sense, Nóvoa (2009) also shows that being a teacher is beyond its basic function: teaching.

In view of this, being a teacher today requires a posture in the face of societal demands and constant changes. As Pinto, Souza, and Melo (2021, p. 8) affirm: “Teachers have never been so demanded by schools and society, in general, as in recent decades, in order to achieve results consistent with the profile of an individual expected for the globalised world”.

Thus, when choosing a licenciante degree course, the prospective teacher must know the particularities of the profession, i.e., the ability to deal with the sociocultural diversity present in classrooms and a critical posture in the face of the structural and emotional adversities that permeate the school environment.

Machado (2004) affirms that knowledge is not only technical, it has ethical and social value. Educating is not only about transmitting knowledge but also about promoting reflection on what this knowledge means, the values associated with it, and how it relates to the student’s personal formation.

In the context of mathematics, the teacher must understand it as a human activity, and not as universal truths, but as an integral part of the ethical and political dimensions of human formation. Machado’s (2004) epistemological view shows that teaching mathematics is more than applying rules: it involves understanding it as historically produced knowledge.

Regarding the mathematics teacher’s job, according to Nóvoa (2019), it is not only to teach it as a curriculum component and subject of basic education, but also to educate a student through it, aiming at their citizenship and the formation of a critical-reflective being. This reflection, with confluence in action, aims at transforming reality, the environment and context, and, why not, a movement to (re)think the paths we follow.

MEMORY AND HISTORY

In this section, drawing on the work of researchers, we will analyse what memory and history are, so that we can later address our methodological choice and the paths followed by the graduates of the mathematics teaching degree course at Unimontes.

According to Le Goff (1994, p. 423), memory “has the property of conserving certain information” and, complementing the author’s view, Meyer (2009, p. 43) understands that its objective “is to give meaning to our lives. It is constantly about fighting against forgetting, to prevent memory from coming to an end, to its conclusion, and that we get lost.” Therefore, memory is much

more than a repository of information; it is essential to give meaning to our experiences and our identity. Remembering is an act of resistance.

According to Peres (2021, p. 73), “memory can be interpreted as reminiscences of the past where they arise in the present, in the thought of each subject, or as a form of our ability to store a quantity of information from facts that were experienced in the past.” In other words, memories connect us with our past, helping us build the present. They are not only a storage of information from our past experiences, but a way to re-signify what has already happened.

Studies related to this field began in the human sciences, specifically in collective memory, and developed through oral investigations and with its own characteristics. As Meyer (2009) states, such characteristics relate to memories in a group’s daily life and rarely concern more significant historical events for historiography. Thus, the collective memory is the truth of people that differs from the official versions.

According to Paiva (2016, p. 21), “collective memory always tends to underlie the group’s own identity and simplifies the idea of time, differentiating the present from the past in a very direct way.” That is, through collective memory, it is possible to study the identity of the group participating in a research study, as well as their choices and information about their past.

In the collective memory, there is also the individual memory. For Halbwachs (1990, p. 51), a French sociologist who coined the concept of collective memory, “each person’s memory is a point of view on collective memory”. In fact, everyone has idiosyncratic characteristics that arise from customs, practices, experiences, and contexts. They are characteristics of the surrounding community that shape their identity.

As the memories are historical sources, we elected to work with narratives built by graduates of the mathematics teaching degree course at Unimontes (2020-2023), analysing their stories and aspirations. After all, according to Paiva (2016), the greater the plurality of sources used by the researcher, the greater the probability of exploring, understanding, and producing new knowledge.

According to Albuquerque Júnior (2007, p. 30), history is a “journey that connects and mixes times and spaces, that interpenetrates things and representations, reality and discourse, reasons and feelings, matter and dream, desire and obligation, freedom and determination”. Therefore, history is composed of events, elements, and characteristics that constitute it. It is the result of choices, actions, and experiences of what has already happened.

All history is “the fruit of time, society, discourse, and nature; it is created through these relationships, whether conflictual or mild, it is a mixture between action and representation, matter and memory” (Both, 2014, p. 18). In this sense, Almeida (2015, p. 44) shows that history is a “narration of what happens in time, articulated to the life, time, and environment of certain subjects”, referring to a specific period.

Similarly, the authors Both (2014) and Almeida (2015) understand that history is not limited to a sequence of events, but rather to a construction that reflects the confluence of time, society, and memory. Each story is constructed from human relationships, and if it is a narration of life and the inserted context, it is a reflection of past experiences, both collective and individual.

According to Both (2014, p. 19), “a story begins through some event that draws attention, surrounded by silences and voids, which long for explanation”. So, in view of the theme of this study, i.e., the paths followed by the graduates of the mathematics teaching degree course at Unimontes, we aim to identify these paths, their academic and professional choices, and how these choices affect each person’s life.

According to the author, the story can be told in different ways, including through narrative. In Both’s words (2014, p. 21), “commonly, in our daily lives, when we communicate, we tell stories, narrate events, share experiences, and describe actions”. Thus, the act of narrating is not to be confused with merely speaking. Almeida (2015) argues that history is a narration, and Garnica (2013) argues that narratives create reality, which are commonly used in oral history research.

METHODOLOGICAL ASPECTS

In this section, we present the methodological option and the sources mobilised in the study, being composed of the narratives of the research participants. To this end, initially, we will discuss oral history and then the path to the (re)construction of the stories.

Oral history can be defined as a research methodology with idiosyncratic characteristics. According to Meihy (1996, p. 13), “Oral history is a modern resource used for document preparation, archiving, and studies regarding people’s social lives. It is always a history of the present time and also known as living history”.

Thompson (1998, p. 25-26) states that oral history “offers, as to its nature, a source very similar to the published autobiography, but of much

greater scope”. Still in the author’s words, a primary merit of this methodology “is that, to a much greater extent than most sources, it allows the original multiplicity of points of view to be recreated”.

In Alberti’s (2005, p. 155) words, “Oral history allows the recording of testimonies and access to ‘stories within history’”. According to Almeida (2015, p. 56), “the works built from the methodology of oral history are fundamentally based on memory, understood as a construction erected in the present considering the experiences lived in the past”.

According to the authors mentioned, oral history is a research resource that, at its core, draws on historical constructs, relies on participants’ firsthand accounts, and recreates and analyses their views of their own history and lived experiences.

According to Alberti (2005, p. 155), oral history is a research methodology that emerged in the twentieth century, following the invention of the tape recorder and the establishment of the Oral History Program at Columbia University in 1948. The author says that it “consists of conducting recorded interviews with individuals who participated in, or witnessed, events and conjunctures of the past and present”.

Therefore, “we consider the existence of historical versions — disregarded as absolute truths, but taken as perspectives through which the theme of interest is shown— so that there may always be other stories depending on the given approach” (Both, 2014, p. 22). Using oral history, the graduates’ narratives are the raw material, a treasure trove for research, producing sources that are important and of interest to researchers.

In this study, we engage in narratives constructed through interviews¹. In fact, oral history allows us to access information that had not yet received attention in previous research. Alves (2016, p. 3) adds that this methodology is characterised by “listening to and recording the voices of subjects excluded from the official story and inserting them within it”.

¹ The construction of the interview involves “researcher, collaborator, research question, place where it is carried out, circumstances of the present and the past, perspectives, intentions of those who speak and those who listen; i.e., it is not about revealing reality as something given, but always constituting this reality, inventing it” (Fernandes, 2014, p. 48-49).

The Way to (Re)Build Many Stories

In the construction of the work, we explored narratives that were recorded, transcribed², and later textualised. We emphasise that, after these processes, we return the documents to the participants for validation. Its use and publicity were authorised through letters of assignment of rights.

The graduates were selected from the contacts we made with each graduate³ from 2020 to 2023 in the mathematics teaching degree course at Unimontes. Table 1 shows the 17 graduates who agreed to participate in this study, including their given names, interview dates, places, and interview durations.

Regarding the use of proper names, Rolkouski (2008, p. 66) endorses that “the maintenance of the names of the deponents [is] a requirement of the oral history (OH)⁴, given its intentionality in constituting historical sources to be made available to other researchers”. During the interview, the participants were informed about the possibility of having their names published in the research, with each participant free to choose. Those who accepted would have their first names announced, but otherwise, we would honour important and relevant figures in mathematics.

Table 1

Data of the interviews

Graduate's name	Date	Local	Duration
Igor Soares Santos	09/28/2024	Google Meet	01:18:55
Luiz Fernando Saldanha Vieira	09/29/2024	Google Meet	01:27:46
Ada Lovelace	09/30/2024	Google Meet	00:59:27
Saulo Henrique Furtado Leite	10/02/2024	Google Meet	01:23:13

² The transcription carries out “the raw and most reliable record of the statements of the deponents, preserving the language vices and the linguistic elements present in the narratives and in the dialogue” (Almeida, 2015, p. 57).

³ We emphasise that we required, on June 25, 2024 -having received the answer on September 2, 2024-, from the general secretariat of the university, information on the graduates, after the research was approved by the Human Research Ethics Committee.

⁴ Oral history.

Welber Paraizo Ferreira	10/02/2024	Google Meet	01:10:46
Giovanna Souza Rodrigues	10/04/2024	CCET	01:51:05
Samuel Scarcela e Souza	10/04/2024	CCET	01:02:26
Pedro Quintino da Silva Neto	10/04/2024	Google Meet	00:43:19
Jadde Thaine dos Santos Oliveira	10/05/2024	Google Meet	01:13:55
Maria Luiza Gomes	10/05/2024	Google Meet	00:57:08
Dyanna Ramos Fiel	10/07/2024	Google Meet	01:09:04
Tiago Henrique Dias	10/08/2024	Google Meet	01:14:38
Marcio Henrique Ferreira de Oliveira	10/16/2024	Google Meet	02:27:36
Sophie Germain	10/19/2024	Google Meet	00:51:12
Alysson Patrick Vieira Santos	10/23/2024	Google Meet	01:18:23
Isaac Newton	10/26/2024	Google Meet	02:53:05
Emmy Noether	11/03/2024	Google Meet	02:05:24

Note. Centre for Exact and Technological Sciences (Centro de Ciências Exatas e Tecnológicas - CCET), located in Building 3 on the Darcy Ribeiro campus of Unimontes.

The interviews were conducted via the Google Meet application after participants requested it and signed the Informed Consent Form digitally, given the distance between the participants and the researchers.

PATHS TAKEN BY GRADUATES FROM THE TEACHING DEGREE COURSE IN MATHEMATICS

Here, we will present and analyse excerpts from the interviews carried out that dialogue with the objective and research questions of this study. After careful reading of the 17 textualisations, we discussed the categories *Professional Choices* and *Academic Choices*, paying attention to both convergent and divergent data.

Professional choices

When completing a degree, a teacher may not always follow a teaching path, whether for health reasons, economic circumstances, opportunities, or even the devaluation of the career. After graduation, the graduate in mathematics has the opportunity to choose to teach or pursue other fields in the labour market, including financial areas, data analysis, and engineering, among others. For them, the possibility of other choices beyond the teaching profession is seen as an opportunity for better remuneration, social prestige, appreciation, and stability.

Given the above, we investigated excerpts from the 17 graduates' accounts of their professional choices. Among them, 11 have taught at some point, while 6 have not yet. In addition, linked to professional choice, we will present their conceptions of possible performance in basic education and, intrinsically to this, their perceptions of the devaluation, intensification, and precariousness of teaching work, as well as the future perspectives of graduates regarding the professional area. At first, we will analyse⁵ excerpts from interviews with the graduates, in which they expressed their assumed position on the choice of teaching.

I am currently a substitute professor at Cefet de Curvelo, in the Civil Engineering course. My first class experience after graduation was that year. And it was now, [...] that I actually said to myself, "if before, during undergraduate course, I did not see myself as a teacher, now, I really am a teacher, and that's what I want" (Excerpt from the report by Saulo Henrique Furtado Leite, interviewed in October 2024).

Saulo, who graduated in 2021, revealed the constitution of his professional identity through his first experience as a teacher and considered that, during his initial education, he did not encounter situations that led him to choose teaching. When asked about the possibility of working in basic education, he argued that he does not want to teach that level, given the precariousness and devaluation of teachers, the physical and emotional exhaustion when having to deal with "*chatterboxes*", who are at school "*just because their father or mother told them to*". He also mentions the extensive workday in basic education, compared to that of higher education. Regarding

⁵ We clarify that, from now on, all excerpts from the reports of our collaborators will be spelled in italics to emphasize their narratives.

his perspectives, he said he intends to pursue a PhD in mathematics to explore other avenues for performance and effectiveness in the degree course.

Regarding what constitutes their professional identity, Pimenta (2002) reveals that it is constructed through the profession's social meaning, the meaning each teacher confers on their daily activity, and relationships with other teachers. This identity is constituted by socialisation before entering vocational education and throughout the career path. Put more clearly, teacher identity results from human interactions.

Currently, after completing my degree, I am working as a temporary teacher of basic education in Brasília, DF, at a high school, in the YAE modality. [...] I attended the selection process in 2023, and that year I got classes (Excerpt from the report by Marcio Henrique Ferreira de Oliveira, interviewed in October 2024).

I am currently very happy working in elementary and high schools in two public schools here in Montes Claros. I also teach private classes and work as a teacher at a philanthropic institution (Excerpt from the report by Sophie Germain, interviewed in October 2024).

Nowadays, I teach private classes at home or at people's homes, and I've been working at the state school since February. I chose teaching (Excerpt from the report by Dyanna Ramos Fiel, interviewed in October 2024).

Currently, I have dedicated myself fully to my work as a basic education teacher. I graduated in 2020, at the beginning of the pandemic, and in 2022, I got certified in the state to teach as a substitute teacher. So, professionally, I have been dedicated solely to education, to my work at school (Excerpt from the report by Isaac Newton, interviewed in October 2024).

The narratives of Marcio, Sophie, Dyanna, and Newton allow us to read their paths at the beginning of their careers. Although with different trajectories, the four indicate their performance in basic education. All are active teachers through temporary contracts.

Marcio narrates his entry into teaching in Youth and Adult Education (YAE). This modality requires not only mastery of content but also social sensitivity in the face of interrupted life stories, for various reasons. For Arroyo (2005), YAE students are characterised by diversity and school dropout, being

young people and adults with unique socio-ethnic-racial histories and trajectories.

Sophie reveals her multifaceted experience in teaching, as she works in elementary and high schools, gives private lessons, and serves at a philanthropic institution, demonstrating her engagement across the different stages and *fronts of education*. Dyanna also works as a private teacher and is a teacher in a state school. Newton is a state school teacher who teaches as a substitute.

As for basic education, Marcio revealed that when he entered the school as a substitute teacher in Brasília, Distrito Federal, he was confronted with a violent reality. The students were people with assisted freedom, drug users. According to him, *“In these moments, I feel totally downhearted with teaching, and I think about abandoning it”*. He also mentioned social devaluation, work carried out outside the school space, low remuneration, and students who bring family problems into the classroom. All this makes him believe that *“It is not worth pursuing this career, and if you do, it will be with a life of suffering”*. That is why the participant stated that he intends to be a higher education teacher.

Dyanna said that, as much as she likes to act and intends to continue in basic education, she failed to have one expectation met, as she found a reality that was not what she expected; that is, students with a lag in basic content and that she must promote them, *“even if the student does not know things”*. The teacher also pointed out problems such as the excessive workload that is taken home, students’ disdain in class and parents’ lack of awareness of their responsibilities, blaming the teachers for children’s school failure.

Sophie and Newton reported that they are happy working in basic education and intend to continue; however, the devaluation of the profession, students’ disregard, the workload that is not compatible with their salaries, and the lack of materials in schools are factors that discourage them. Both participants said that, to avoid feeling overwhelmed when leaving the workplace, they try to take the service home to a minimum and take care of their mental and physical health to support this process.

Still on the performance in basic education through temporary contracts, Maria Luiza, Samuel, and Alysson added that:

I am currently teaching in a state school here in my region. I chose teaching. [...] I started working at a school here in the rural area, as there was a vacancy for a mathematics teacher (Excerpt from the report

by Maria Luiza Gomes, interviewed in October 2024).

Today, I am a substitute mathematics teacher working in basic education, I have been taking classes by contract since the beginning of the year, I have not yet been able to take a full position for a whole year, only replacing some vacation contracts or medical certificates (Excerpt from the report by Samuel Scarcela e Souza, interviewed in October 2024).

I started teaching in 2022, and I am currently at Colégio Tiradentes, and since I went to teach in a classroom, I realise how difficult it is to be a teacher, because there are so many things that the teacher is responsible for (Excerpt from the report by Alysson Patrick Vieira Santos, interviewed in October 2024).

Maria Luiza revealed the pleasure of working in basic education in a rural school. The graduate expressed her satisfaction at being able to plan and implement it in the classroom, given the small number of students at her school. However, she revealed negative experiences she had regarding social devaluation, as she had already been asked “*what to be a teacher for*” and whether “*there was no other profession for her to choose*”. For her, people “*think that I am a teacher because I had no option or ability to do anything else, and that the only thing left was to teach*”. Currently, she does not intend to change her profession; however, she wants to teach in higher education and recognises that, in the future, she may change her mind and choose another area.

Samuel, realistically and critically, testified that he questions whether it is really teaching what he wants to do professionally, especially when acting as a substitute teacher in public schools, where students “*start to mess up in the classroom*”, making him feel that work activity is exhausting. He says he intends to continue teaching, although he is looking at new horizons; if another opportunity arises with better remuneration, he will abandon teaching.

About being a substitute, Samuel added that the students say: “*The other teacher, we can even respect, but with you, we do it as we please*”, revealing a greater precariousness for the substitute teacher. Also, for him, there are the unpaid activities —inherent to the teaching work— that are imposed; he not only is far from receiving the salary ceiling, but also due to the high workload inside and outside the school, which causes him to perceive that “*Sometimes, it seems that it does not pay to be a teacher, in the face of so many difficulties that affect the profession*”.

Alysson reported that he is not happy with his choice to continue teaching and expressed his discontent regarding the scarce amount of time for the other areas of his life, because, working in basic education, he has a view that the teacher needs to live for work, and, to get a reasonable salary, it is necessary to teach in many classes and in several schools at the same time, greatly increasing the amount of work. According to him, *“On the weekends, we should be resting; nevertheless, we are doing school stuff. Being a teacher leaves you no time for the other things in life.”* For this reason, he is reconsidering his career choice and intends to abandon it.

At the end of 2019, I began teaching in courses for university entrance examinations and public competitions. However, in 2020, the pandemic hit, and I did not teach in the classroom; I only taught privately. In 2021, I returned to teach preparation courses for the university entrance examination and public competitions for the Military Police, Criminal Police, and Firefighters. In 2022, it was my first year in a regular school class at Colégio Excelência, a state school, where I stayed only in 2022 (Excerpt from the report by Tiago Henrique Dias, interviewed in October 2024).

Tiago’s report notes that he began teaching before he majored in 2021. Romanowski and Martins (2013) found that some prospective teachers begin teaching before completing the course.

Regarding his performance in basic education, Tiago shows that, even though he teaches in a private school, which in his view is better than public schools, he observes the precariousness of the profession, the excessive workload, and the inconsistent remuneration, since *“It is not that the teacher earns poorly, the teacher earns little for the workload of teaching”*. However, he is happy with his choice to be in teaching, because he likes teaching and does not see himself pursuing another profession. In the future, he wants to teach higher education. On entering the profession during the pandemic, Welber revealed that

[...] it ended in 2020, still in remote classes, 2021 came, and we were also teaching remotely. In 2022, face-to-face classes returned, so I started working in person, in public schools. I continued teaching in 2023 at two state schools and a private school. [...] Then I decided to stop teaching to pursue a master’s degree (Excerpt from the report by Welber Paraizo Ferreira, interviewed in October 2024).

Welber pointed out that, although he has already worked in basic education, he does not intend to teach at this stage of schooling, mainly “*for financial reasons and due to the high workloads*”. For him, the financial situation, that is, the remuneration of basic education teachers, “*is not the best*”; teachers need better salaries and working conditions, and, therefore, he is seeking a better placement after taking graduate studies to teach in higher education.

Regarding the workload being supposedly lower in higher education, it is necessary to understand that teachers at this level do not necessarily work fewer hours than basic education teachers. In general, the work regime in public universities allows for a lower classroom workload than in basic education, since higher education teachers allocate their workday to activities such as research, guidance, academic production, participation in examination boards, and extension projects.

On the other hand, in basic education, two-thirds of the workload is carried out in the classroom, leaving only one-third for planning and other activities. In other words, at both levels, these professionals assume additional responsibilities and are pressured to devote personal time to work-related activities. Regarding the performance in higher education, Pedro adds:

I currently teach private classes, both for basic education students and undergraduate students, and also in the Pharmacy Course at UFMG, in a subject focused on mathematics, let's say, which is like a Calculus I subject, but more basic (Excerpt from the report by Pedro Quintino da Silva Neto, interviewed in October 2024).

Pedro never wanted to work in basic education because, from a young age, he saw his mother, a school teacher, “always very exhausted” from the amount of work, and “when she came home she had more school work to do, especially planning the following classes”. In other words, the work does not end at school. This intensification is why he chose not to work there; he wants to work in higher education.

The 11 excerpts from the interviews analysed so far reveal two main characteristics: all work, or have worked, as teachers with temporary contracts; and working in basic education is a subject that causes concerns, mainly due to the devaluation, intensification, and precariousness of teaching work, and working in higher education is their desire.

Regarding the temporary hiring of teachers, Francklin and Fernandes (2023) state that, in the current neoliberal educational scenario, workers are at

the mercy of the economy on the payroll, and, regarding the costs of the rights of a permanent teacher, public institutions make use of short-term contracts, expanding the flexibility of the forms of employment contract. Such flexibility prevents the professional from having access to a career plan and developing long-term work in the institution, further increasing the conditions of disrepute and devaluation of the profession.

Next, we will analyse excerpts from interviews with graduates who did not pursue a teaching career, the reasons for this, and their perspectives on basic education.

In my professional life, after graduation, I did not start teaching [...] I have not entered the job market yet, as I am currently focusing on my academic career (Excerpt from the report by Jadde Thaine dos Santos Oliveira, interviewed in October 2024).

Currently, I am not teaching, I chose not to teach after concluding my degree course. So my only experiences in the classroom so far are from the projects and the practicums I did. But I intend to teach, as I am a teacher and I want to work in teaching (Excerpt from the report by Luiz Fernando Saldanha Vieira, interviewed in September 2024).

Jadde's and Luiz Fernando's narratives converge in indicating that they did not pursue teaching because they wanted to work only after completing postgraduate courses. Both want to work in higher education in the future.

For Jadde, the non-choice to work in basic education stems from the content taught at this level, which is not interesting, and from students' lack of maturity. In undergraduate studies, "*academics are adults and are easier to deal with, while in basic education, many are there because they are practically forced to, imagine [having to cope with] the screaming of a sixth-grade class for the rest of your life. I don't think that's cool.*" Also, a concern for the participant is the devaluation of basic education, both in terms of salary, precarious work space, lack of support from higher levels, and devaluation of society. Now, "*unquestionably, people don't see a public school teacher and a university teacher the same way, and that's a shame.*"

According to Luiz, the reasons for not wanting to work in basic education are the salary issue, students' lack of interest, the poor structure for developing work activities, and the unpaid workload behind the curtains of a teacher's life. She revealed that she lived with relatives, who are mathematics

teachers, and realised that they were in a constant loop⁶ of school activities, both inside and outside the house. In this way, when they should be at rest and leisure, they were working. Also, the graduates Ada and Igor revealed their reasons for not choosing teaching, asserting that:

So far, almost a year after graduation, I have not taught, nor do I teach in the classroom. Because I had another profession, I chose to prioritise it, since, at the end of college, I had to give up working to finish the course, and financially, this profession pays better than teaching (Excerpt from the report by Ada Lovelace, interviewed in September 2024).

I am not currently teaching. I work as an analyst at a technology company that sells a retail system. And, I only want to teach, and continue in the teaching career, if it is in higher education (Excerpt from the report by Igor Soares Santos, interviewed in September 2024).

From Ada's and Igor's narratives, we noticed that both, in addition to not following teaching, went to other fields of the labour market. Ada works in a "*better paid than teaching*" profession, engineering; Igor is working in a technology company.

Igor stated that after completing his degree, he did not want to teach as a profession because he believed these professionals "*suffer a lot,*" and, as a result, he blocked the idea of teaching. In addition, his philosophy of life is "*I want to work to live, I don't want to live to work*".

By living with his basic education teacher, his mother, and seeing the excessive workload she takes home, the little social recognition and financial return, as well as the lack of quality time, Igor lost his attraction for the profession. He wondered: "*How am I going to become a teacher when education is not recognised and much less valued as it should be? It's painful and inhuman to be a teacher, and I don't want to suffer like that.*" Therefore, for him, the only possibility of acting in teaching is in higher education. Still on having taken a distance and not choosing teaching in basic education, Emmy and Giovanna reveal that:

After graduating, I submitted some curricula to private schools in Montes Claros because the assignment process had already been

⁶ In this context, *looping* refers to a vicious, repetitive, and exhausting cycle of tasks without significant breaks.

completed the previous year, and I had not registered. I was not successful with the school issue, because I was informed that they make teacher selections the year before. [...] Therefore, I did not go to basic education after graduation (Excerpt from the report by Emmy Noether, interviewed in November 2024).

As a graduate, I found graduate school a little difficult. I majored in mid-2023, and to be able to take classes in the state, I had to be registered for assignments. I wasn't registered, so I couldn't take classes. I registered this year, but my position was one of the very last because I don't have teaching experience, and I didn't want to take classes outside Montes Claros since the wages wouldn't be sufficient for the back-and-forth. So that is why I chose not to go into teaching (Excerpt from the report by Giovanna Souza Rodrigues, interviewed in October 2024).

Emmy and Giovanna report having taken a distance from teaching, mainly due to bureaucratic issues related to temporary hiring in the state of Minas Gerais. As the graduates pointed out, they were not able to teach at the end of their degree because they had not registered for this kind of contract, which is done in the year before the school year.

Giovanna reveals that even after enrolling in the state's temporary hiring selection process for the 2024 school year, she did not receive a placement because she lacks time of service and is at the end of the ranking list. In view of this, the question is: How will graduates who recently completed their degree and who are at the beginning of their career have the necessary and required experience to try to rank better in the lists of temporary positions, if it is their first attempt to get a job and acquire time of service and experience? In this perspective, it is unequal and exclusive for those who have not yet had the opportunity to acquire experience and length of service.

The previous question was answered by other graduates, who stated that beginning teachers need to face more challenging situations, such as teaching in other municipalities, assuming replacement contracts for shorter, fragmented periods, and teaching in rural schools, which hinder their definitive insertion in the profession.

Regarding basic education, Emmy explained that teaching at this level of education is not her first option, nor does she have the prospect of acting in this space, after all, it is increasingly difficult to teach at school, "*because the teacher must use their voices a lot, students are increasingly uninterested*".

Giovanna indicated that she wants to work in basic education but is unsure about her professional future due to the high workload, the arrival of artificial intelligence and the possible changes it may entail, and the imminent privatisation of public schools. With all this, we get to the following question: *“Will teachers still exist in a few years? Or will we be replaced by something else?”*

The six excerpts from graduates who did not choose teaching in basic education prompt us to reflect on the reasons for not choosing teaching in basic education and on how little it is desired. In this reality, we must highlight the devaluation, intensification, and precariousness of teaching work, including salary issues, disrespect, student disengagement, high workload, and the limited time for rest if they follow this path. Consequently, they opt for a common future: teaching in higher education as an escape from the reality of basic school.

Regarding not choosing basic education, a survey⁷ carried out by the Semesp Institute, linked to the⁸ Ministry of Education, indicates that by 2040, Brazil will face a teacher shortage, and the deficit of these professionals can reach up to 235,000. The causes of this blackout are mainly the lack of interest among young people in undergraduate degrees; the ageing of the current teaching staff; and abandonment of the profession due to low wages, poor government investment in education, and the intensification of poor working conditions. Such problems have affected the physical and mental health of professionals. In summary, the forecast is that, within less than two decades, Brazil will be short of 235,000 teachers in basic education.

Gatti and Barreto (2009, p. 240) point out that “a teacher’s initial salary, in general, has been low when compared to other professions that require higher education”. If that were not enough, the lack of a career plan and public competition for teaching, social devaluation, and little infrastructure in schools weigh on those who seek this work and are factors that cause aversion and abandonment both by those who are working and by those who are in the period of choosing the profession.

⁷ Available at: <https://www.semesp.org.br/pesquisas/risco-de-apagao-de-professores-no-brasil/>. Accessed on: December 10 2024.

⁸ “The Semesp Institute, an analytical intelligence center created by Semesp, is made up of specialists with solid experience in collecting and analyzing data on higher education” (Semesp, 2024). Available at: <https://www.semesp.org.br/instituto/sobre/>. Accessed on: December 10 2024.

In addition to the reasons indicated above, Nóvoa (2009) argues that teachers are given tasks that go beyond their basic function, that is, teaching. In addition, it seems to be up to this professional to solve family and social problems that students bring to the classroom, relate to and act with and in the community where they are, and have a manager profile.

Academic choices

According to Silva *et al.* (2023, p. 1), in a “world managed by labour relations, the choice to take a course after graduation glimpses possible perspectives in professional terms”, i.e., choosing to advance in studies, through graduate, *stricto sensu*, or *lato sensu* courses, is a decision that can represent an important step in the academic education of prospective teachers; in addition, advancing in studies is also a form of professional appreciation. Thus, in this category, we will analyse 17 excerpts from graduates of the mathematics teaching degree course at Unimontes, covering the period 2020 to 2023, regarding their academic choices.

After my graduation in June 2021, I joined the master's degree in Pure Mathematics, in July, at Unb, and completed it [...] it was in undergraduate studies, taking the subjects and seeing my teachers teaching the classes, I saw that I wanted to follow the master's degree, so there was a great influence from there (Excerpt from the report by Saulo Henrique Furtado Leite, interviewed in October 2024).

In academic life, I completed my master's degree in mathematics at UnB last year. I was approved at the end of my undergraduate degree, so I left Unimontes in 2021 and went straight to another university to continue my studies, all during the pandemic (Excerpt from the report by Marcio Henrique Ferreira de Oliveira, interviewed in October 2024).

[...] I left graduation, and I went straight to the master's degree. I completed it and I am already in the PhD in Mathematics, going to the second semester (Excerpt from the report by Jadde Thaine dos Santos Oliveira, interviewed in October 2024).

As soon as I finished my degree, I went on to a master's degree in Modelling at Unimontes. I started in 2020 and finished in 2022, I did it all during the pandemic. And in 2024, I would say that as a hobby and because I like to study, I started the Physics course at Unimontes as well (Excerpt from the report by Alysson Patrick Vieira Santos, interviewed in October 2024).

I am currently pursuing a PhD in Mathematics at UFMG in Belo Horizonte (Excerpt from the report by Pedro Quintino da Silva Neto, interviewed in October 2024).

From the narratives of Saulo, Marcio, Jadde, Alysson, and Pedro, we note that all have already completed their master's degrees. Jadde and Pedro are currently pursuing a PhD in Mathematics, and Alysson has started another degree in Physics. A trend observed in the narratives is the immediate transition from undergraduate to graduate studies. This trend indicates a clear decision regarding their academic choices, since, when deciding to continue their studies, the graduates reveal a search for better bases for insertion in the profession and for conditions of remuneration and appreciation.

Also, something highlighted by Saulo, Marcio and Jadde – masters in Mathematics from the University of Brasília – was the influence the degree course had on their decision to continue their studies, as during their initial education, they were encouraged by their professors to pursue graduate studies. Still on the continuation of studies after the completion of the degree, Welber, Emmy, and Luiz Fernando added that:

[...] I went through selection processes at institutions such as UFMG and UFJF, and I also did so for the National Laboratory of Scientific Computing (LNCC) [Laboratório Nacional de Computação Científica], where I am currently working. Today I am pursuing a master's degree in Computational Modelling here in Petrópolis (Excerpt from the report by Welber Paraizo Ferreira, interviewed in October 2024).

I took two isolated subjects in the graduate program in Education at Unimontes, and during this time, not to stand still, I started taking Accounting Sciences at Unimontes, a course I had started before Mathematics. At the end of 2023, I made the selection process for the master's degree in Education at Unimontes' PPGE, was approved, and took a leave of absence from the Accounting course (Excerpt from the report by Emmy Noether, interviewed in November 2024).

I currently have a master's degree in Pure Mathematics from the Federal University of Viçosa. I completed my graduation in December 2023, and at the beginning of 2024, I entered graduate studies (Excerpt from the report by Luiz Fernando Saldanha Vieira, interviewed in September 2024).

The reports of Welber, Emmy, and Luiz Fernando agree regarding the fast referral, in Luiz's case, to the master's degree after majoring. The three are in the process of completing this course, in different areas and institutions, namely, Computational Modelling at the National Laboratory of Scientific Computing, Education at Unimontes and Mathematics at the Federal University of Viçosa.

Emmy's statement shows that, at the end of the mathematics teaching degree, the graduate resumed another degree, Accounting Sciences, which she had interrupted when entering Mathematics. The master's student simultaneously participated in isolated subjects in the postgraduate program in Education (PPGE) of Unimontes, and the approval in the selection process for this master's degree culminated, again, in the interruption of the second degree, revealing its centrality in teacher education. Still on the continuity of education in the postgraduate studies, Sophie, Dyanna, Maria Luiza, and Giovanna commented that:

When I graduated, I was already enrolled in two specialisations: Methodology for the Teaching of Physics and Mathematics and Financial Mathematics and Statistics. I currently have two in progress: Inclusive Education and Financial Education. I pursued the master's degree, and my project was approved, but I chose not to go, as I know it is not the right moment yet. I took an isolated subject (Excerpt from the report by Sophie Germain, interviewed in October 2024).

I am doing a postgraduate course in Financial Education provided by the state. I am enjoying it a lot, and I want to try the master's degree in Education at Unimontes. Last semester I took an isolated subject and I liked it, so I will wait to finish the postgraduate course and I will try it (Excerpt from the report by Dyanna Ramos Fiel, interviewed in October 2024).

[...] I intend to do a master's degree in Education. [...] I took a lato sensu postgraduate course in school supervision because, from my practice, this was an area that caught my attention (Excerpt from the report by Maria Luiza Gomes, interviewed in October 2024).

In my academic life, after graduation, I took some isolated subjects at Unimontes' PPGE and will try the master's degree in Education. I am also doing a postgraduate degree at the IF of Ubá in Technologies Applied to Education, and I will finish in 2025. I decided to do this postgraduate course because I did not want to stand still, because I feel

the need to study and learn more in the area of Education (Excerpt from the report by Giovanna Souza Rodrigues, interviewed in October 2024).

The four reports show continuing education as an intentional practice, in the sense of ongoing learning, articulated with both contextual demands and individual professional development projects. Sophie revealed that after graduation, she felt the need to specialise in Inclusive Education and Financial Education, as the Mathematics teaching degree course at Unimontes did not adequately prepare her to work in these areas in practice, necessitating deeper knowledge in these areas. Explaining why they did not take a postgraduate course after completion of their degree, Newton, Tiago, Ada, and Igor added that:

[...] I intend to specialise, continue my studies, but not at the moment. After graduation, I did not do any postgraduate studies, but I really want to (Excerpt from the report by Isaac Newton, interviewed in October 2024).

In academic life, I haven't done anything yet, but I've been studying a lot for the ENEM. I really want to try a master's degree in Mathematics Education (Excerpt from the report by Tiago Henrique Dias, interviewed in October 2024).

My goal was to finish college and start the master's degree, it was in my plans. However, due to financial issues, I had to work this year to make ends meet. I decided to take this year off without any academic activity, such as a master's or specialisation. However, next year, I intend to return to my studies, first doing a postgraduate degree in Engineering and then I really want to try a master's degree in Applied Mathematics (Excerpt from the report by Ada Lovelace, interviewed in September 2024).

That year, I registered for the selection process to enrol in the master's program. I registered at the Unimontes PPGE as a regular student starting in 2025. I intend to pursue a master's degree, then progress in my studies (Excerpt from the report by Igor Soares Santos, interviewed in September 2024).

These four reports converge in the sense that neither Newton, Tiago, Ada, nor Igor undertook any postgraduate studies after completion of their degree. Although they have not continued their studies, all of them show that they want to pursue a master's degree and specialisations in the future. Ada

wishes to enter a postgraduate course in her other area of work, Engineering, as well as a master's degree in Applied Mathematics, and Igor has already registered in the selection process for the master's degree in Education at Unimontes' PPGE, with the intention of completing it and progressing to doctoral studies. Regarding the possibilities of a second undergraduate course, Samuel states that:

If I am going to continue in academic life, advancing in my studies, it would be in a different degree. I'm considering doing Physics to increase my chances of teaching classes. Or, if I am to take another undergraduate course, it will only happen if I find and like another area of work. [...] I am not interested in postgraduate studies, as it would be a good opportunity, but it is not something that appeals to me (Excerpt from the report by Samuel Scarcela e Souza, interviewed in October 2024).

In Samuel's report, we can notice formative (re)orientations and the non-choice for postgraduate studies in his academic and professional project. It reveals a divergence from the other reports in the academic choices category. This is because the graduate did not complete any postgraduate course, nor does he intend to enter a master's degree program. The only academic possibilities are other undergraduate courses, such as Physics, to increase his chances of teaching, or taking up another area, if he is interested in abandoning teaching.

The 17 narratives presented in this category attest that continuing education is an option that the graduates of the mathematics teaching degree course at Unimontes have envisioned and already put into practice. They aim to continue their studies; five have already completed master's courses, and two are currently pursuing a PhD. The continuing education course undertaken by the graduates is permeated by a desire for a better professional placement and is part of a personal project to achieve their dreams. Thus, these narratives show that teacher professionalisation goes beyond initial teacher education, constituting a continuum of development built in personal and procedural ways.

CONCLUDING

Researching professional and academic choices, as well as the prospects of graduates of licenciature degree courses, allows us to understand the reality in which they find themselves. Moreover, it allows an overview of the teaching profession and the choice, or not, to pursue it.

Thus, the study aimed to thematise the paths followed by a group of seventeen graduates of the mathematics teaching degree course at Unimontes,

who graduated from 2020 to 2023, including their academic and professional choices, performances, perspectives, and reflections on basic education. The questions that guided this work were: What factors contributed to or did not contribute to the choice of academic and professional paths of graduates of the mathematics teaching degree course? Did these paths lead them to continue teaching that started during or after their undergrad studies, or, on the contrary, did they choose other areas in the labour market?

We will make our final considerations to meet the objective and answer the questions presented above, using the categories *Professional Choices* and *Academic Choices*, analysed in the previous section. To this end, we will present the findings of this study and the possible inferences.

The legacy of the mathematics teaching degree course at Unimontes, regarding the temporality of this study, from 2020 to 2023, in quantitative terms, reveals that, professionally, of the 17 participants, 11 are working or have already worked in teaching at some point after and during graduation, and 6 have not yet taught in classes at formal educational institutions.

Of the graduates who did not work in teaching at any time after graduation, two have jobs in other areas of the labour market; two are not working, as they entered *stricto sensu* graduate studies, one at the master's level and the other at the doctoral level; two did not get vacancies to teach in basic education, nor in public calls to compose the staff of hired teachers, nor in private schools.

Of the 11 graduates who followed teaching, all, without exception, are teachers who work/act through temporary contracts, replacing teachers on vacation, on medical leave, or filling vacant positions, either in public or private institutions. Of these, two work as professors in higher education, teaching undergraduate courses in engineering and pharmacy; eight are currently teaching in basic education, in state, private schools, and/or philanthropic institutions; and one has worked in schools but is away studying for a master's degree in Computational Modelling.

The 17 graduates participating in the study reported discontent with the profession regarding devaluation and intensification and precariousness of teaching work, characterised by low wages; excessive workload inside and outside the school space; low quality of life, in view of issues such as exhaustion, obligation to deal with students who show no interest in the educational process, few moments of rest and leisure due to work activities. By

the way, 10 graduates expressed interest in teaching in higher education, of whom 3 are currently working, and 1 has already worked in basic education.

Of the interviewees, 5 graduates indicated they intend to continue or work in basic education, and three said they do not intend to continue teaching. Of these, one already envisions other areas of work and the other two do not intend to leave immediately; however, they do not aim to stay for long, especially if higher-paid jobs and a career plan emerge.

Regarding academic choices, five graduates completed master's degrees at different institutions and in different fields, predominantly in mathematics. Two are PhD students in Mathematics, and one has started another degree in Physics. Three of the graduates participating in this study are studying for the master's degree; four are studying or have already completed specialisations. Of these, three have already participated in isolated disciplines of the Unimontes PPGE. Four have not yet engaged in any academic activities after undergraduate studies, but intend to pursue a master's degree. One graduate showed that he is not taking any postgraduate studies and does not intend to take any.

The professional and academic choices of graduates of the mathematics teaching degree course at Unimontes are permeated by lived experiences, tastes, and opportunities. Based on the built and analysed narratives, we conclude that teaching in basic education is neither envisioned nor desired by seven participants, and that they expect to teach in higher education. Also, there is a scenario of abandonment and not choosing the profession due to experiences or coexistence with teachers in schools.

In short, they expect to be approved in public competitions to become permanent teachers, whether in basic or higher education. In addition, they intend to enrol in master's and doctoral courses in the future to improve their placement in the labour market. Postgraduate education is a choice made by 12 of the 17 graduates participating in this study, as they aim to teach in higher education or on a personal and professional project.

We argue that postgraduate courses are also an option for those who want to work in basic schools, not only for those who want to teach in higher education, as this level requires professionals qualified for pedagogical work who maintain their qualifications through continuing education. Investing in the continuing education of basic education teachers contributes to improving teaching and learning processes, developing pedagogical practices, and strengthening the profession as a field of knowledge and research.

AUTHORSHIP CONTRIBUTION STATEMENT

SMO: conceptualisation, data curation, research, methodology, visualisation and writing – original writing. SPNCA: methodology, supervision, validation, and writing – review and editing.

DATA AVAILABILITY STATEMENT

The data supporting the results of this study will be made available by the corresponding author, SMO, upon reasonable request.

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