



EDUCATION OF TEACHERS OF THE INITIAL YEARS OF ELEMENTARY SCHOOL IN THE FACE OF OVERCOMING DIFFICULTIES IN MATHEMATICS

FORMAÇÃO DO/A PROFESSOR/A DOS ANOS INICIAIS DO ENSINO FUNDAMENTAL FRENTE À SUPERAÇÃO DAS DIFICULDADES EM MATEMÁTICA

FORMACIÓN DE PROFESORES/AS DE LOS PRIMEROS AÑOS DE LA ESCUELA PRIMARIA ANTE LA SUPERACIÓN DE LAS DIFICULTADES EN MATEMÁTICAS

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Abstract

This research started from the guiding questions: What are the difficulties encountered by teachers of the initial years of Elementary School in the face of the subject of mathematics? How can these difficulties be overcome? Thus, the research aimed to identify the difficulties encountered by teachers in the initial years of Elementary School in relation to the discipline of mathematics, highlighting how they were overcome. The data was collected through the application of a questionnaire to 07 teachers working in the initial years of Elementary School, and was analyzed through Content Analysis. Three categories emerged: (C1) Reports of personal experiences in relation to the subject of mathematics; (C2) Overcoming difficulties in mathematics; (C3) Academic suggestions for teacher education. From the results found, it was noted that in-service education, the exchange of experiences and the availability of materials that address mathematical content are factors that directly affect overcoming the difficulties with the subject.

Keywords: Pre-service Education. In-service Education. Mathematics Teaching.

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Resumo

Esta pesquisa partiu das questões norteadoras: Quais as dificuldades encontradas por docentes dos anos iniciais do Ensino Fundamental frente à disciplina de matemática? De que maneira estas dificuldades podem ser superadas? Assim, teve como objetivo identificar as dificuldades encontradas por professores/as dos anos iniciais do Ensino Fundamental frente à disciplina de matemática, destacando de que modo foram superadas. Os dados foram coletados a partir da aplicação de um questionário para 07 docentes atuantes nos anos iniciais do Ensino Fundamental, e analisados à luz da Análise de Conteúdo. Emergiram 03 categorias: (C1) Relatos das vivências pessoais em relação à disciplina de matemática; (C2) Superação das dificuldades em matemática; (C3) Sugestões acadêmicas para a formação docente. A partir dos resultados encontrados, verificou-se que a formação continuada, a troca de experiências e a disponibilidade de materiais que abordam os conteúdos matemáticos são fatores que afetaram diretamente a superação das dificuldades com a disciplina.

Palavras-chave: Formação Inicial. Formação Continuada. Ensino de Matemática.

Resumen

Esta investigación partió de las preguntas orientadoras: ¿Cuáles son las dificultades que encuentran los docentes en los primeros años de la escuela primaria frente a la temática matemática? ¿Cómo se pueden superar estas dificultades? Así, tuvo como objetivo identificar las dificultades encontradas por los/las docentes en los primeros años de la escuela primaria en relación con la disciplina de las matemáticas, destacando cómo fueron superadas. Los datos fueron recolectados a partir de la aplicación de un cuestionario a 07 docentes que trabajaban en los primeros años de la escuela primaria, y analizados a la luz del Análisis de Contenido. Surgieron tres categorías: (C1) Informes de experiencias personales en relación con la asignatura de matemáticas; (C2) Superación de dificultades en matemáticas; (C3) Sugerencias académicas para la formación del profesorado. De los resultados encontrados, se encontró que la formación continua, el intercambio de experiencias y la disponibilidad de materiales que abordan contenidos matemáticos son factores que inciden directamente en la superación de dificultades con la disciplina.

Palabras clave: Formación Inicial. Educación Continua. Enseñanza de las Matemáticas.



1 INTRODUÇÃO

This research involves reflection regarding teachers who have had difficulties with the subject of mathematics. The theme arose from our personal experiences (and discontent) with the subject, allowing for reflection on possible weaknesses in pre-service education.

In this context, we raise the following guiding questions: What are the difficulties encountered by teachers of the initial years of Elementary School in the face of the subject of mathematics? How can these difficulties be overcome? In order to answer these problems, this research aimed to identify the difficulties encountered by teachers in the initial years of Elementary School in the face of the subject of mathematics, highlighting how these difficulties were overcome.

To this end, a questionnaire was applied to 07 teachers in the initial years of Elementary School, which was divided into two parts: questions about the teacher's profile; 12 questions (03 objective and 09 dissertation) about teacher education, teaching practice and experiences with the subject of mathematics. For this research, four questions were analyzed, in light of Content Analysis (CA), as proposed by Bardin (2011).

In order to clarify some concepts, Teacher Education for the initial years of Elementary School and mathematical knowledge were addressed with the following theoretical framework: Vila and Callejo (2006); Lorencini Júnior (2009); Cunha (2010); Imbernón (2011); Lopes *et al.* (2012); Silva and Oliveira (2014); Arrais *et al.* (2015); Costa, Pinheiro and Costa (2016). It was important to discuss these topics in order to understand at least the importance of pre-service and in-service education in the teaching career and the mathematical knowledge necessary for professional performance in the initial years of Elementary School.

2 TEACHER EDUCATION

Teacher education involves the knowledge of the teacher, which in turn covers the system in its organizational structure, and the problems that give rise to the construction of knowledge: the pedagogical knowledge, the methodological-curricular knowledge, and the contextual knowledge (IMBERNÓN, 2011). In this perspective, Lorencini Júnior (2009) highlights that:

The didactic profile of the teacher has been designed throughout his/her academic life as a student and teacher, as well as through the conditions of his/her adaptation to the school context. Thus, this outlined model of the teacher is very ingrained, offering a strong resistance to change, requiring, therefore, a conflict that can put this personal didactic model in question (LORENCINI JÚNIOR, 2009, p. 27, our translation).



Although this model encounters resistance to change, knowledge must be constituted in and for change based on constant reflection on teaching practice (IMBERNÓN, 2011). According to the same author, it is practical knowledge that establishes professionalization.

Thus, disciplinary knowledge needs to have connections with its social utilities, taking into account experimental knowledge in practice. It is clear, therefore, that professionalization is related to teaching practice, proving to be conditioned to a network of power relationships (IMBERNÓN, 2011). That is, the more studied the practice, the greater the possibilities for reflections.

In this way, adequate teacher education manages to reconcile distinct, peculiar and complex skills aimed at practice and reflection. That is, when the teacher reflects on his/her own practice, questioning it, he/she is possible to develop strategies for change, when necessary, giving a new meaning to the teaching practice (LORENCINI JÚNIOR, 2009).

In-service education, in turn, is a necessity for the teacher, as it has the objective of making him/her more professionally qualified for his/her performance in the classroom. This education helps in their own performance, but also in their students' and co-workers' performance, since the constant reflection on practice allows changes in the educational scope. In addition, in-service education values the teacher, making him/her reflective and open to new educational concepts (SILVA; OLIVEIRA, 2014). The authors add that:

[...] in-service education and teacher appreciation go hand in hand and through it one can achieve appreciation, gaining strength to demand better working conditions. This appreciation begins with the teaching action itself, when motivated by knowledge, it starts to value the opportunities it finds in teacher education, instigating to increasingly have new work horizons (SILVA; OLIVEIRA, 2014, p. 80, our translation).

In view of the above, teacher education constantly implies decision-making. Given the questions of this investigation, it is important to reflect on the education of teachers for the initial years of Elementary School, with emphasis on mathematical knowledge.

2.1. TEACHER EDUCATION FOR THE INITIAL YEARS OF ELEMENTARY SCHOOL AND MATHEMATICAL KNOWLEDGE

In this topic, aspects of teacher education will be pointed out, in general, with respect to the mathematical knowledge necessary for professional performance in the initial years of Elementary School.

In Brazil, Law nº 9.394/96 establishes the Guidelines and Bases for national education. As provided in its article 4, it is the duty of the State to guarantee free education “from 4 (four)



to 17 (seventeen) years of age, organized as follows: a) pre-school; b) elementary education; c) High School” (BRAZIL, 1996, art. 4, item I – Included by Law No. 12,796, of 2013). Children enter Elementary School at 06 years of age and this stage lasts for 09 years, being divided into: the initial years of Elementary School (from the 1st to the 5th year) and the final years of Elementary School (from the 6th to the 9th year).

The teachers investigated in this research taught, at the time of data collection, in the initial years of Elementary School. According to article 62 of the Law of Guidelines and Bases (LDB) (BRAZIL, 1996), high school education, in the normal modality, qualifies to teach in Early Childhood Education and in the initial years of Elementary School, while for the performance at other levels of education, higher education is required, in undergraduate or full degree courses. In other words, in order to teach in the initial years of Elementary School, teachers must have at least high school education, in the normal mode, and/or higher education, in a full degree course in Pedagogy, being that several Brazilian municipalities accept training in a degree course with qualifications in specific fields.

The Curricular Guidelines of Paraná (2008) [state located in the South of Brazil] discuss that teacher education of the initial years of Basic Education must be based on three major dimensions of knowledge, namely: knowledge of the curricular disciplines, interdisciplinarity and socio-historical context. In addition, Mathematics Education is seen as a field of study, based on a field of critical action, with mathematics (and its knowledge) being a human activity under construction.

According to Cunha (2010), the fundamental elements for teaching work in mathematics in the initial years of Elementary School are: content mastery and pedagogical mastery. In short, the teacher must have mastery of the mathematical content, as well as the methods for working with them in the classroom. This is due to the fact that the types of activities proposed “[...] will certainly influence the way these students in the future will face and create relationships with mathematical knowledge” (COSTA; PINHEIRO; COSTA, 2016, p. 508, our translation).

Other aspects to be considered are the peculiarities, specificities and individualities of each person, as well as their personal and cultural experiences, and their prior knowledge. This will all influence the learning process. Lopes *et al.* (2012, p. 91, our translation) substantiate that “[...] the individual’s life story and professional trajectory can be taken as a reference for the organization of curricular subjects in teacher education courses for teachers or future teachers”.



Mathematics is no different. In addition to previous experiences and knowledge that contribute to the development of mathematical skills, potentialities can be promoted through learning opportunities; and positive positions in relation to this discipline can be assumed.

Regarding pre-service teacher education, Costa, Pinheiro and Costa (2016) state that little is taught about concepts, as the focus is on methodologies and strategies on how to teach mathematics. Considering there are people who have had difficulties with the subject of mathematics during their Basic Education, the authors add that:

[...] no pedagogical practice will be able to make up for deficiencies in teacher education. Therefore, it is possible to question the idea that in a course that trains teachers, the knowledge that teachers will need to develop in their students is based only on the education they received during Elementary and High School. Unfortunately, this has been the reality of mathematics teacher education. Thus, the education of the educator ends up being based on ways of teaching (how), neglecting what to teach (COSTA; PINHEIRO; COSTA, 2016, p. 509, our translation).

From this quotation it is possible to affirm that there is promotion of pedagogical mastery during pre-service teacher education. However, the same cannot be said about content mastery. Now, how is it possible for a teacher to teach a discipline without knowing it effectively?

Upon becoming teachers of the initial years of Elementary School, in addition to planning the different activities, didactic resources and evaluative resources to be used in the classroom, there is a need to master all the content presented, including the mathematical knowledge. As discussed by Vila and Callejo (2006, p. 43, our translation), “[...] between the designed curriculum, the curriculum developed by the teachers and what the students really assimilate, there are usually differences and discrepancies”.

This is due to the fact that people are different, have their own thoughts, different experiences and realities. That is, they build and reconstruct knowledge in a heterogeneous way. Therefore, it is not enough for the teacher to memorize concepts, equations and activities; it is necessary to understand what is explained. Only then will it be possible to engage the majority of the students.

Arrais *et al.* (2015) add that the educational practice in relation to school content, especially mathematics, must be organized so that the assimilation of concepts becomes a process that causes internal cognitive and meaningful actions and operations.



3 METHODOLOGICAL PROCEDURES

The organization of this section was based on clarifications regarding data collection and the organization and selection of the analytical *corpus*, which is described by Bardin (2011, p. 126, our translation) as “[...] the set of documents taken into account to be submitted to the analytical procedures”, as well as several concepts related to the interpretative procedures indicated by Content Analysis, as proposed by Bardin (2011).

3.1. DATA COLLECTION AND THE RESEARCH CORPUS

This research is of qualitative nature, since it considers the phenomena and the attribution of meanings in the qualitative process, the environment being the source for data collection and the researcher the instrument (SILVA; MENEZES, 2005).

It is important to clarify that this research is linked to the project: The teaching and learning of science and mathematics in the classroom and in informal environments, registered in Platform Brazil (or Plataforma Brasil, in portuguese). CAAE (Certificate of Presentation of Ethical Appreciation): 57663716.6.0000.5231. Number: 1.666.360. Approval: 01/08/2016. Validity: 31/07/2021.

For this specific data collection, a questionnaire was applied to teachers who taught in the initial years of Elementary School. Initially, 15 questionnaires were distributed in a municipal school in the state of Paraná, 10 of which were answered and returned to the researchers. It is important to note that the data collection took place in the second half of 2019, in person.

The questionnaire was divided into two parts, the first of which consisted of the identification of the teacher profile. We asked for a brief identification of the research participant based on questions about age, time in the profession, professional performance, pre-service and in-service education. This data was important to know the professional's profile, education, and the levels of education and modalities in which he/she worked. This information elucidated our understanding of the professional's trajectory and peculiarities.

The second part of the questionnaire consisted of twelve questions, three of which were objective and nine were dissertative. It was decided to apply a greater number of dissertative questions in order not to limit the answers of the teachers, leaving them free to position themselves according to their experiences and peculiarities.

Based on the premise that this research sought to know the experience of teachers of the initial years of Elementary School, who at some point in their education experienced difficulties



in mathematics, the questionnaires answered by teachers who did not have such difficulty were discarded. Therefore, of the 10 questionnaires answered, 07 were selected for analysis. In addition, so that this article does not become too long (making it impossible for submission), a selection of the questions to be analyzed (for this occasion) was made, with question numbers 01, 07, 09 and 12, illustrated in the Table, being presented next:

Table 1 - Questions selected for analysis

| | |
|--------------------|--|
| Question 01 | Do you have or have you ever had difficulties in appropriating the mathematics content in your Basic Education period? Give a brief account of when you noticed this difficulty: in what year/grade did this occur, and the consequences it brought to your life. |
| Question 07 | To teach in the initial years of Elementary School, do you consider that the mathematics content learned in pre-service education is sufficient for a person who had difficulties in mathematics? Why? What suggestion would you make for teacher education courses to help overcome this problem? |
| Question 09 | How did you try to overcome the difficulties to teach the contents that you did not feel confident in? Was there help from anyone? If so, from whom? |
| Question 12 | Did in-service education contribute or has it contributed to overcoming your difficulties with mathematics? In what way? |

Source: Questionnaire applied for data collection.

The answers to these 4 questions, of the 7 questionnaires selected for analysis, constituted the *corpus* of this research, the other questions, in their entirety, are part of our archive and at opportune moments shall be investigated and disclosed.

3.2. CONTENT ANALYSIS: FROM FRAGMENTATION TO CATEGORIZATION

As previously mentioned, in passing, the data analysis was carried out in light of Content Analysis, as proposed by Bardin (2011), which can be defined as “[...] a set of communication analysis techniques that uses systematic procedures and objectives for describing the content of messages” (BARDIN, 2011, p.44, our translation). The steps suggested by the author, which were followed during the analysis process are: pre-analysis; exploration of the material; and interpretation of the results (BARDIN, 2011).

Initially, in the pre-analysis step, a first reading of the 10 answered questionnaires was carried out. From this, 03 were discarded, considering that the teachers who answered them made it clear that they had no difficulty in mathematics during their education. An addendum can be made to highlight that these teachers had their undergraduate education in Exact Sciences, with 02 undergraduates in Mathematics and 01 in Chemistry.

Subsequently, four questions were selected for analysis, the criteria of which are listed below: the identification of whether the teachers had difficulties in appropriating the mathematical content; verifying that, according to the teachers, the mathematics content,



learned in pre-service teacher education, were sufficient to teach in the initial years of Elementary School; evidence of the difficulties encountered by these teachers to teach mathematics and ways of overcoming this, highlighted by themselves.

During the exploration of the material, the answers were transcribed, unitarized, coded and categorized, following the steps proposed by Bardin (2011). For unitarization, the answers were broken down into 51 Units of Analysis.

For coding, we used letters and numbers: the letter U was used to identify the Units of Analysis (U1 to U51); the letter Q to identify the Question (Q1, Q7, Q9 and Q12); and the letter T to identify the Teachers (T1 to T7). As these three letters were followed by numbers, the code U1Q1T1 refers to the Unit of Analysis 01, referring to Teacher 1's answer to Question 01; the code U2Q7T7 refers to the Unit of Analysis 02, referring to the answer of Teacher 7 to Question 07, and so on.

Subsequently, we move on to the categorization of the Units of Analysis. Three categories and four subcategories emerged from the data, without previously established criteria, and were coded as follows: C1, C2 and C3, to represent the three categories and the letter S to refer to the Subcategories, followed by the numbers 1 to 4 (S1 to S4). Therefore, the code S1C1 refers to subcategory 01 of category 01; the code S1C2 represents subcategory 01 of category 02, and so on.

In the next section the presentation of the data is organized, considering the interpretations and descriptions highlighted above.

4 RESULTS AND DISCUSSIONS

As indicated, some personal information from the teachers which were asked contributed to our evidence, so we subdivided this section into two subsections: in the first, bringing what we call the teacher profile; and in the second, the description of the categories and subcategories accompanied by examples and criteria that led us to such results.

4.1. TEACHER PROFILE

Regarding the teacher profile, we had the following results: 06 women (W) (T1, T2, T3, T4, T5 and T7) and 01 man (M) (T6). The age varied between 31 and 54 years; and the time of profession between 05 and 25 years. As for the pre-service teacher education, T1, T2, T3 and T4 had graduated in Pedagogy; T5 in Languages; T6 in Geography; T7 in Biological Sciences.



With regard to in-service education, at the time of data collection, only T3 did not have a postgraduate degree, and only T5 had a *Stricto Sensu* postgraduate degree (Masters in Language Studies). The other teachers had a *Lato Sensu* postgraduate course (specialization courses) in the following fields: Special Education (T1); Special Education (T2) and Psychomotor Education (T2); School Management (T4) and Youth and Adult Education (T4); Geography Teaching Methodology (T6); Ludic Teaching (T7), Pervasive Developmental Disorder (T7) and Arts (T7).

In order to facilitate the visualization of the teacher profile of the research participants, this data was organized in the table below:

Table 2 - Teacher Profile

| T | Age | Sex | Professional experience | Pre-service Education | In-service Education | Working level |
|----|----------|-----|-------------------------|-----------------------|---|--|
| T1 | 31 years | W | 05 years | Pedagogy | Specialization in Special Education | Early Childhood Education and initial years of Elementary School |
| T2 | 33 years | W | 07 years | Pedagogy | Specialization in: Special Education; Psychomotor Education | Early Childhood Education and initial years of Elementary School |
| T3 | 45 years | W | 15 years | Pedagogy | Did not have Post-Graduation | Early Childhood Education and initial years of Elementary School |
| T4 | 54 years | W | 25 years | Pedagogy | Specialization in: School Management; Youth and Adult Education | Early Childhood Education and initial years of Elementary School |
| T5 | 48 years | W | 20 years | Languages | Masters in Language Studies | Early Childhood Education; initial and final years of Elementary School; High School |
| T6 | 54 years | M | 18 years | Geography | Specialization in Geography Teaching Methodology | Early Childhood Education and initial years of Elementary School |
| T7 | 49 years | W | 12 years | Biological Sciences | Specialization in: Ludic Teaching; Pervasive Developmental Disorder; Arts | Early Childhood Education and initial years of Elementary School |

Source: Research participants.

In view of this data, it was possible to verify that all teachers were licensed, had teaching experience, worked in Early Childhood Education and in the initial years of Elementary School and, in their majority, had postgraduate degrees. Despite this, no teachers has specializations carried out in the field of teaching and learning in mathematics.



4.2. DESCRIPTION AND ANALYSIS OF CATEGORIES AND SUBCATEGORIES

At first, the Units of Analysis were grouped into three categories, as follows: (C1) Reports of personal experiences in relation to the subject of mathematics; (C2) Overcoming difficulties in mathematics; (C3) Academic suggestions for teacher education. Subsequently, two subcategories emerged for C1 and C2, totaling 04 subcategories – for C3, no subcategories emerged. The categories and subcategories will be described and discussed below.

C1 – Reports of personal experiences in relation to the subject of mathematics: this category included the personal reports of the teachers' experiences in relation to the subject of mathematics. According to Mendes *et al.* (2012), reports on experience are a way of presenting data about the past experiences, which reflect the theory and practice in professional education. In this category, 12 Units of Analysis were inserted (U1Q1T1, U2Q1T1, U1Q1T2, U1Q1T3, U1Q1T4, U2Q1T4, U1Q1T5, U1Q1T6, U2Q1T6, U3Q1T6, U1Q1T7, U2Q1T7, U2Q1T7), that were accommodated in the subcategories, according to the school context in which these experiences occurred (as a student or as a teacher).

S1C1 (School context as a student): encompassed 05 Units of Analysis (U1Q1T1, U2Q1T1, U1Q1T4, U2Q1T4, U1Q1T5), which recorded teachers' personal reports regarding their experiences with mathematics when they were students, that is, in their schooling period (Basic Education and/or Higher Education). Some examples can be seen below:

I had a lot of difficulty during Basic Education (U1Q1T1, our translation).

This happened in the 5th year. I had a teacher who did not like to explain, wrote the content on the board and said: solve it. With that, I had a lot of difficulties and ended up traumatizing myself because I managed to get through, but I didn't understand the content [...] (U2Q1T1, our translation).

It occurred in the 5th grade of Elementary School, due to the comparison/excess of expectations of a teacher (U1Q1T4, our translation).

[...] in my educational background I have always had difficulties to learn mathematics (U1Q1T5, our translation).

From the reports it was possible to see that teachers had difficulties in mathematics since Basic Education, and this difficulty was often related to the methodology used by the teacher. In this perspective, Nepomuceno and Bridi (2010) emphasize that:

Many learning difficulties are due to inadequate methodology, unmotivated and incomprehensible teachers, fights and discussions between classmates. The school should be the individual's second home, a place where he/she can feel good and be among friends, count on the teacher whenever he/she needs to or whenever he/she has a family problem (another cause of learning difficulties) and can keep in touch with other members of the school team, as well as the pedagogical coordination (NEPOMUCENO; BRIDI, 2010, p. 11, our translation).



The school, as an environment of human development, aims to lead the student to self-knowledge, identifying his/her difficulties, and providing opportunities to overcome them. Thus, teachers have fundamental roles in students' life trajectories, being mediators in the teaching process and in the learning process.

S2C1 (School context as a teacher): encompassed 07 Units of Analysis (U1Q1T2, U1Q1T3, U1Q1T6, U2Q1T6, U3Q1T6, U1Q1T7, U2Q1T7), which presented teachers' personal reports regarding their experiences and difficulties in mathematics as teachers, that is, in their teaching practice. Two reports were used as examples:

I have difficulty. I realized at the beginning when I started teaching Elementary School –the initial grades. The consequences were and still are harmful. I have to dedicate myself more to planning mathematics and studying content (U1Q1T2, our translation).

I suffered a lot when I taught a 5th year (U2Q1T7, our translation).

The reports due to the fragility of the mathematical content brought negative experiences in teaching. This difficulty can be explained by the insufficient pre-service education, with regard to mathematical content. Trindade (2004) states that this process is constituted by the social fragmentation of a mechanical, superficial study that is found in the school environment.

Therefore, no teaching practice, in isolation, without foundation and reflection, can supply for fragile and decontextualized formation (COSTA; PINHEIRO; COSTA, 2016). Thus, it is necessary for teachers to look for ways to overcome their difficulties, since it is necessary for them to teach mathematical content in the initial years of Elementary School. This is due to the fact that, regardless of the higher education of these teachers (Pedagogy, Biological Sciences, Languages and Geography), in the initial years of Elementary School, they will teach “different areas of knowledge: Portuguese Language, Mathematics, Science, History geography” (LIMA, 2012, p. 151).

C2 – Overcoming difficulties in mathematics: this category covered the explanations about the way in which these professionals managed – and continued to seek – to overcome their difficulties in mathematics, since the teachers started to teach this subject in the initial years of Elementary School. Araújo and Cardoso (2006, p. 5, our translation) point out that “[...] in any pedagogical situation, difficulties may arise in the elaboration of concepts”. However, overcoming this is necessary, and it is up to the individual to find ways for this to happen. This category contained 22 Units of Analysis (U2Q1T3, U2Q1T5, U4Q1T6, U5Q1T6, U1Q9T1, U1Q9T2, U2Q9T2, U1Q9T3, U1Q9T4, U1Q9T5, U1Q9T7, U1Q9T6, U2Q9T6, U1Q9T7,



U1Q12T1, U1Q12T2, U1Q12T3, U1Q12T4, U1Q12T5, U1Q12T6, U2Q12T6, U3Q12T6), organized into the subcategories, according to the assistance received for overcoming the reported difficulties, either through material resources or through other individuals.

S1C2 (Aid through material resources): encompassed 06 Units of Analysis (U2Q1T3, U5Q1T6, U1Q9T2, U1Q9T3, U1Q9T6, U1Q12T1). Answers related to the use of material resources, such as books and the Internet, were categorized to help overcome difficulties in teaching mathematics, as can be seen in the selected examples:

Then, alone, I went to the books again to search for content that I felt the need to absorb better (U5Q1T6, our translation).

Help in books (U1Q9T2, our translation).

Studying hard, with videos on YouTube, math books, among other tools (U1Q9T3, our translation).

I looked for books (U1Q9T6, our translation).

It was found to be of great importance to use material resources in search of help in times of difficulty with certain content. These materials helped in the learning itself, and, therefore, in teaching, since they brought activities to be developed in the classroom.

However, as pointed out by Sadovsky (2007), the use of materials is not enough to help in the learning process; there is a set of factors that, together, will collaborate so that there is a significant experience with the mathematical content, which involve: material selection, methodology, content mastery, teacher and student relationships, among other aspects.

S2C2 (Aid through other individuals): encompassed 16 Units of Analysis (U2Q1T5, U4Q1T6, U1Q9T1, U2Q9T2, U1Q9T4, U1Q9T5, U2Q9T6, U1Q9T7, U1Q12T2, U1Q12T3, U1Q12T4, U1Q12T5, U1Q12T6, U2Q12T6, U3Q12T6, U1Q9T7), the answers pointed to the importance of helping others in relation to ways of working with mathematics in the classroom. Some examples are presented below:

When I have any difficulty or questions, I always seek help from someone to avoid making the same mistake that my teacher did. My coordinator or someone who masters the content better (U1Q9T1, our translation).

I sought help from people who mastered the content and applied it in concrete everyday situations (U1Q9T4, our translation).

I looked for friends or family members who understood the field to explain it to me better (U2Q9T6, our translation).

A teacher, about to retire, who helped me with her experience (U1Q9T7, our translation).

There were exchanges of experiences between educators and they shared knowledge (U3Q12T6, our translation).



The statements categorized here highlighted the importance of people to overcome difficulties. In addition, these teachers, by sharing their actions and perceptions, gave a new meaning to teaching. When thinking about the action and reflecting on it, an opportunity for change is created, leaving aside the mere transmission of content (SCHÖN, 1995).

Nóvoa (1995, p. 28, our translation) corroborates this, stating that “[...] teacher education is done through critical reflection on the practice as well as through the permanent reconstruction of the personal identity, therefore, it is important to invest in the person and give status to the knowledge of experience”. In this way, teacher education is understood as a fundamental tool for permanent learning.

C3 – Academic suggestions for teacher education: in this category we inserted the academic suggestions for improving the quality of teacher education with regard to mathematical content. As explained by Imbernón (2011), the teaching profession must be in constant movement. Thus, it is important to minimize the gaps found in teacher education. In this category we accommodate 17 Units of Analysis (U1Q7T1, U2Q7T1, U1Q7T2, U2Q7T2, U1Q7T3, U2Q7T3, U1Q7T4, U1Q7T5, U2Q7T5, U1Q7T6, U2Q7T6, U3Q7T6, U1Q7T7, U2Q7T7, U1Q12T1, U3Q12T7, U4Q12T7) which brought suggestions for changes in the pre-service undergraduate courses, in order to minimize the gaps found by these teachers, which we exemplify with the records of T7, T1, T2 and T5.

The teacher education courses should offer us an adequate preparation to face the questions of the students, since most of the newly graduated teachers are unprepared, and they are powerless in the face of the needs of the class during the learning process. (U2Q7T7, our translation).

There would have to be more practice than theory in teacher education, so the teacher would not have so many difficulties when he/she starts (U2Q7T1, our translation).

Classes should be more dynamic, that would help a lot in teacher education (U2Q7T2, our translation).

For the education of future teachers, I think a greater number of teaching methodology classes in the areas of language, mathematics and also in other areas is essential. (U2Q7T5, our translation).

There should be more practice than theory in political-pedagogical projects (U1Q12T1, our translation).

According to the reports of these teachers, it was possible to find gaps in their teacher education. In teacher education courses, theories are approached in a generic and superficial way, suggesting weaknesses in the association with teaching practices (GATTI, 2010). There is an imbalance in the theory-practice relationship due to the theoretical treatments in the teacher education process, which leads to the formation of an abstract and little integrated



character (GATTI, 2010). For this reason, theory and practice need to be constantly associated and D'Ambrosio (1997) completes this stating:

The mixture of a theoretical and a practical posture is the first root of motivation, the first awareness, the substrate on which generation, intellectual and social organization take place, and the diffusion of knowledge. The sensitive reality, which some call the "universe of symbols", expands (D'AMBROSIO, 1997, p. 65, author's quotation marks, our translation).

Therefore, it is up to the teacher to recognize his/her difficulty and the permanent search for help through in-service education and the exchange of experiences, facing fears, insecurities and minimizing the gap arising from his/her pre-service education, in order to give a new meaning to his/her teaching practice.

5 FINAL CONSIDERATIONS

In this research, answers from 7 teachers who were teaching in the initial years of Elementary School were analyzed, but they had (at the time of the data collection) difficulties with the subject of mathematics identified in the training process, lasting until their teaching practice.

After the application of the questionnaire and the selection of the research *corpus*, the teachers' answers were unitized in 51 Units of Analysis, which were subsequently categorized and subcategorized in light of Content Analysis. From this set of procedures, three categories and 04 subcategories emerged, as follows: (C1) Reports of personal experiences in relation to the subject of mathematics, organized into two subcategories – S1C1 (School context as a student) and S2C1 (School context as a teacher); (C2) Overcoming difficulties in mathematics, divided into two subcategories – S1C2 (Aid through material resources) and S2C2 (Aid through other individuals); (C3) Academic suggestions for teacher education (without emerging subcategories).

Based on the analyzes and discussions carried out, it was possible to achieve the objective proposed by the investigation regarding the difficulties encountered by the 07 teachers in relation to the subject of mathematics, as a student and/or as a teacher. For the first context, teachers reported difficulties in learning mathematics, both in Basic Education and in Higher Education. Difficulties that, for the most part, were related to the methodologies used by their teachers, leading to poor understanding of the content and even trauma. While teachers reported difficulties in teaching mathematics in the initial years of Elementary School, leading to greater dedication and planning of these contents.



With regard to overcoming these difficulties, it was found to be a continuous process, with the aid of material resources, such as books and the Internet, and other individuals. It became possible to state, based on the results found, that in-service education, the exchange of experiences and the availability of materials that address mathematical content were factors that directly affected the overcoming of difficulties with the subject.

Finally, teachers brought academic suggestions for teacher education, such as: overcoming the dichotomy between theory and practice; adequate preparation to face students' questions; the use of different teaching methodologies in the subjects during pre-service education, including the accomplishment of practical classes.

We realize, therefore, that a person who has/had difficulties with the discipline of mathematics may be able to teach this discipline, dedicating himself/herself daily to overcoming this, becoming a teacher of the initial years of Elementary School which is each year more qualified. In this way, we agree with the theoretical framework that accompanied us in the development of this investigation and that understands practice as the founder of constant resignifications in the teaching profession.

Based on the results found, we were able to elaborate some questions for the future development of other research, among which we highlight: Are the curricula of undergraduate courses suitable for teacher education aimed at the initial years, considering that teachers can have difficulty with the subjects they need to teach? Are teachers being trained in order to become reflective professionals and not merely reproducers of knowledge? How is it possible to overcome the gaps found in pre-service teacher education?

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