

## The influences of the training teacher and the specific knowledge in the choice of Math teaching

Cristiane da Silva Stamberg<sup>1</sup>, Cátia Maria Nehring<sup>2</sup>

Universidade Regional do Noroeste do Estado do Rio Grande do Sul (UNIJUÍ), Ijuí-RS, Brazil

### Abstract

This article is part of the first author's doctoral research, with orientation from the second, and it aims to problematize teacher training, analyzing a group of teachers who act as teacher trainers in mathematics and in basic education. Its problematic is to identify which references teacher trainers identify as significant for the option of being a teacher, as well as the knowledge involved in this craft. The theoretical framework is supported by Shulman, Tardif, Nóvoa, Paiva, Roldão and other interlocutors who deal with the initial formation and teaching knowledge of teacher trainers. Six professors with different academic backgrounds from a Federal Institute participated in the research, which works in the formation of basic education - high school and with the training of teachers - teaching license in mathematics. The research data collection instrument involved a semi-structured interview, applied in the year 2015. To perform the data analysis, we used the Discursive Textual Analysis anchored in Moraes and Galiazzi (2007), which is a data analysis approach in qualitative research. It was possible to identify two foci of analysis, from the theoretical and empirical field: The teacher trainer - the formation which leads to the professional constitution, and the discipline knowledge - a north for the future teacher. The results make evident the important role of the teacher trainer in the initial formation, indicating that they influence the formative actions, the process of constitution of the profession and the movement of the knowledge of each teacher. The study also reveals that the mastery over the object of study they will teach is necessary and a condition to be a teacher, but not sufficient for his profession as a teacher of basic education.

**Key words:** Teacher training in Mathematics. Teacher knowledges. Teacher trainer.

### Introduction

This research shows as a central theme the discussion over the trainer teacher of new Math teachers. The study aims to identify the significant references and influences shown by trainer teachers for their teaching option. In consequence it is possible to furthering and to comprehend the knowledge from these trainer teachers, in particular the Math ones, as well as to analyze the way their knowledge affects on the teaching practices and how this knowledge is perceived on their performance.

The relevance of these influences highlights on training performances used by their previous teachers showing a discussion over the role these trainer teachers develop on the professional choice, influencing on the decision making in being a

---

1 Doctor in Education in Sciences – UNIJUÍ – Member of GEEM – Study group in Math Education – UNIJUÍ. Professor at *Instituto Federal Farroupilha* – Campus Santo Ângelo – RS. (Farroupilha Federal Institute – Campus Santo Ângelo – RS, Brazil). Email: cristiane.stamberg@iffarroupilha.edu.br

2 Professor/Doctor at *Universidade Regional do Noroeste do Estado do Rio Grande do Sul – UNIJUÍ*. (Regional University of the Northwest part of Rio Grande do Sul state – UNIJUÍ, Brazil).  
Advisor on the Post graduation program in Education in Sciences – UNIJUÍ – Professor leader on GEEM – Grupo de Estudos em Educação Matemática – UNIJUÍ (Study group in Math Education – UNIJUÍ). Email: catia@unijui.edu.br

teacher and showing positive and negative aspects on their academic life which tag their professional identity.

It is believed that on the initial education, the trainer teacher has great significance on the professionalism<sup>3</sup> formation of future teachers because, besides performing his professional activity, this teacher influences directly on the pedagogical formation and conception of the future teacher, not only on the concept elaborations, but also on the way these concepts will be worked and on the values they adopt when working the contents in class, becoming, from this point on, a model on the teaching learning.

The consideration and investigation of experienced experiences on the initial formation allow the future teacher to accomplish his own comprehension of the work context, discovering himself on the teaching practice, and understanding this is the profession he intends to follow, forming his own professional identity.

### **Knowledge teaching as frameworks for the teacher performance.**

Researches by Cavalcante (2011), Souza (2011), Belo (2012), Teixeira (2012) utilize the term “reproductive cycle” and emphasize that in professional practice the teachers use their own teachers as example, being that each trainer develops his training practice based on his own understandings, based on personal experiences while he was a student among his reference teachers. By remembering the practice of some teachers it comes to mind the image of those who taught, who left pieces in their lives. Besides, they also strengthened the academic relation to the knowledge area, to which defines the taste, or not, for the subject.

Thus, when discussing about the initial education of the teachers it implies addressing the way the teaching professional identity becomes effective, based on the elements that connect the personal identity to the professionalism perspective, as well as the influence they receive from the academy. The trainer teacher, in example, the specialized professional needs to take and to answer the demands beyond his education. Tardif (2012) asserts in this sense:

[...] the basis for teaching, such as seen by the teachers, does not limit itself to the contents well circumscribed that it would depend on a specialized knowledge. They cover a great diversity of objects, questions, problems related to its work. In this sense, the professional knowledge is plural, compound and heterogeneous [...] quite diversified coming from several sources, probably from a different nature. (TARDIF, 2012, p. 213)

This statement takes into consideration the fact that being a trainer teacher means to go beyond the content, instrumentalizing it, in practice with inherent problems in the teaching and learning process. On the teaching practice, the diverse knowledge exists and is used by the teacher who provides a building and rebuilding move in the teaching/learning process. For his actions, this teacher becomes reference to his alumni (graduated), influencing them with his personal traits and professional life.

3 Professionalism: “it is specific in the teacher action, it means, the set of behaviors, knowledge, skills, attitudes and values which build the uniqueness of being a teacher” (GIMENO SACRISTÁN, 1995, p. 64) The professionalism is built in a progressive and continuous way, it is based on the competence development and on the professional identity, it starts in the professionalization and extends throughout the career, that is why, it is a process that allows teachers to appropriate the “practices”, the culture and the professional values” (TARDIF; FAUCHER, 2010, p. 35).

The idea of teacher training, regardless their teaching area, goes through the development of attitudes according to the subject education. It is important to consider that in the teaching learning process, only teaching contents is not enough. According to Tardif (2012, p. 31), “teaching is working with human beings, about human beings, to human beings”. This assertion refers to the understanding that the personal dimensions also must be considered in the teaching training, and practices from the teacher trainers must be reference to the alumni.

Nóvoa (2009, p. 31) asserts that “in teaching, the professional dimensions always cross, inevitably, with the personal dimensions”, understanding that the teaching/learning goes way beyond the technical training and the competences set to be taught in the initial formation. Tardif (2012) understands teaching as an interactive activity, a human work about human beings, in which personality, spirit and affection are intrinsic elements.

For Cruz and Marcel (2014), articulating the student view about his good teacher, related to his professional do is relevant and appropriate, to analyze the identification of the reference teacher done by his students in formation linking perception and practice.

In that sense, the trainer teacher has an important role in the constitution of new teachers. According to Paiva (2013, p. 92), “Knowing why you teach for, what you teach for, who you teach for and how you teach for, is essential to do in class.” This way, this professional identity happens since the personal and professional development process built in a procedural mode and always keeps intertwined because it is produced in every moments in his daily practices.

For Roldão (2007), teaching practice does not reside in “passing” knowledge, but, mainly, in creating conditions for the other to learn and to arrogate something. The author argues that is not enough to give available information for the other to learn, but it is needed organization in actions that takes the other to learn, what is needed is a vast knowledge field. In that sense, the teachers enlist and produce knowledge in the initial formation and also in their professional path, which help to build their identity and to improve the teaching while trainer teachers.

Tardif (2012, p. 36) analyzes the professional knowledge issue and its relation to the problem of vocational education and the teacher training defining the teacher knowledge: “[...] as a plural knowledge, formed by amalgam, a little coherent, from professional formation knowledge and disciplinary, curricular and experiential knowledge”.

Such definition implies the understanding of the teaching identity as a result of constant transformation along his existence, in example, his life history, his personal traits, his own way of acting in front of some situations, or in the way of relating to the other. These factors help to define the way how relations will be established such as in his professional activities, as with the family and society because all of them will integrate the knowledge construction process which are linked along life.

The teaching knowledge construction is related to the teaching work at school and to the social context in which the craft<sup>4</sup> is inserted, in example, the Basic Education

4 Craft: According to Roldão (2005, p. 14), “craft is related to the professional competences to which embody a *professional knowledge*, a central element in the professional practice, which embodies essentially in the *teaching* action. The teacher is seen as a keeper of content knowledge to which he shows and provides, making the knowledge he knows public, and the students take the responsibility of learning, as a result of his effort and their capacities”. The

school and the Superior Education. It is not enough to talk about action, it is necessary to argue the reason why the teacher acts in a determined way. This movement is the condition in the training process, that is why the trainer teacher experience becomes significant in the teacher training process for the Basic Education.

Shulman (1986, 1987) identifies the inherent knowledge to the teaching profession of teachers and its professionalization. The author asserts the importance of the teacher, since his actions, to understand the content to be taught and how this one must create his pedagogical action which determines the comprehension of the content by the student, in example, how to transform the scientific knowledge in scholar knowledge. It is not enough the teachers to appropriate the knowledge and concepts which are from a scientific academic formation, but it is necessary they can communicate and mediate this knowledge in a way comprehension exists and it becomes significant to students. It is worth agreeing with the author that the subjects of their own actions carry professional and life histories which enlist and produce knowledge on the exercise of their practices.

Corroborating with this idea, Paiva (2013) asserts that teaching a discipline, in case of Math, it requires from the person who teaches, a knowledge domain different from the demanded to be a Mathematician because the discipline worked at school has own and different traits which it is demanded competence and it goes way beyond the knowledge of mathematical contents. According to Shulman (2005), there should be concern about the scientific and pedagogical knowledge on the bias from who teaches to the comprehension of how the contents will be worked, aiming the syllabus organization, in example, the teacher needs to consider the teaching learning process of the concepts.

The teacher, for many times, is known only as a “knowledge transmitter”, but he needs to go beyond the discipline knowledge domain and to consider the work process and the social relations in the daily life, establishing relations between theory and practice, changing the scientific knowledge into scholar knowledge. According to Shulman (2005), teachers’ knowledge is triggered, related and also built during the teaching and learning, composing a complex craft which demands from the teachers the specific knowledge domain and, also, didactic and pedagogical one being mobilized and produced in his professional every day.

In relation to the knowledge, it corroborates with Tardif (2012) who defines the “knowledge” term in a wider sense which covers the knowledge, the competences, skills (abilities) and the professional practice attitudes. According to the author, the teachers’ knowledge is mobilized and built in the work achievement, therefore, it is linked to the teaching situation and practices. In this sense, it is possible to consider that the knowledge from the trainer teachers is, also, defined as teaching professional model.

For Tardif (2012), the knowledge developed by the teachers is that embodied in the direct relation with their functions and teaching actions. It is believed, this way, the trainer teacher must be engaged to the teaching, mainly in the relation to the locus of his action, in example, his action at the Basic Education school must be

---

construction of this *professional knowledge* results of the complex, organized and coherent mobilization from all this [knowledge] around each concrete educational situation, in the sense of the achievement of professional action definer aim – the student’s learning” (ROLDÃO, 2005, p. 18).

committed to the propitiated knowledge in the initial training process. It is understood by Imbernón (2004, p. 55). that:

[...] the initial training process is very important, because it is the set of attitudes, values and functions which the students in the initial education confer on the profession, it will be submitted to a number of changes and transformation in line with the socializing process which occurs on this initial education. There is where determined habits are generated which will focus on the profession activity.

Likewise, Imbernón (2004, p. 65) also asserts that it is “[...] in the initial education that the basis for the future teacher must be provided so he may build the specialized pedagogical knowledge”. In this way, for the function performance of teaching and also graduating Math teachers for Basic Education, according to Donato (2007, p. 128), it is necessary “a different and specific education which complements the disciplinary training (on the chosen area), especially if he wants to perform an innovative role”. It is necessary, thus, a proposal of a thought, articulated and performed education from the understanding of new teachers in the Math Education field.

According to André (2012, p. 37), “the education has a considerable weight on the teaching professionalism construction, in example, on the knowledge development, skills, attitudes, values which represent the teacher’s uniqueness”, making difference on his teaching practice and also on the future teachers. The trainer teacher has direct involvement on the education and pedagogical conception of the future teacher, not only for the disciplinary contents, but also, in the ways of working with them, just like in the development of his class practice and in the constitution of the professionalism.

Leite (2011) asserts that the teaching/learning on graduation courses needs to consider the future professional locus:

[...] the teachers’ education needs to be thought from his work context, not being able to conceive it displaced or distant from the critical reflection over the school reality. It is needed to consider over this dimension through the syllabus proposals, activities which allow the dynamic understanding and the established relations on the teaching work context. (LEITE, 2011, p. 40-41)

It is possible to affirm, the trainer teacher has a meaningful responsibility because the initial education is, also, a moment in which the images about the meaning of the teacher are developed, through the contact with the discipline contents or the experiences, interactions and practices the graduated ones are exposed. For that, the trainer teachers need to be clear of what, besides his way of teaching, they also contribute for the reconsideration of the formative processes, creating in the graduated students situations they may problematize their future teaching method and their role, aware of their professional locus.

## **Methodological Procedures**

This research has qualitative character, based on the theoretical-methodological references from the Oral History of Math Education and from the Discursive Textual Analysis (DTA).

The Oral History of Math Education is considered a qualitative research method and has as the main intention the appreciation of oral narratives as a research source, which collaborates with the scientific discourse. According to Garnica (2003), the discourses narrate experiences, information and the understandings from who creates the teachers' education, in this specific case, in a Federal Institute. Moraes and Galiuzzi (2007) think the methodology principles of the Discursive Textual Analysis (DTA) aim to produce new comprehensions over the phenomena and discourses.

A research was created and it involved the participation of six trainer teachers in a Federal Institute, they work in the Math graduation course and in the High School. The choice for the teachers happened from the interview application to 54 graduate students on the Math graduation course aiming to identify their reference trainer teachers.

The interview analysis identified six teachers with higher reference status, who were invited to participate in a research which happened during the PhD Thesis, they had four moments and specific interviews. The clipping presented in this article considered the first interview performed with the trainer teachers group aiming to show the references taken as significant for the option of being a teacher based on the context and situations from their education process and in the lived aspects by these subjects. The interview issue, focused on this output is the path on the education and constitution of being a teacher, considering the relevant actions to the Federal Institute.

The data was collected in the 2015 year and the teachers were identified by letters (A, B, C, D, E and F). From the interview analysis over the trainer teachers' understandings on the Basic Education and Higher Education it was possible to identify in each statement the speeches having feelings and expressive meanings to this research issue, whose speech marks are defined by Garnica (2003, p. 3) as "meaning units".

From the interview analysis and the theoretical dialogue, two analysis foci were defined: the trainer teacher – the education triggering the professional constitution, and the disciplinary knowledge – a guide to the acting of the future teacher. The first concerns the trainer teacher influence on the education and pedagogical conception of the future teacher, while the second concerns the knowledge object domain and the need for a change of this understanding to be a Math teacher.

### **The trainer teacher: education triggering the professional constitution**

The first analysis focus - "the trainer teacher: the education triggering the professional constitution" concerns about the trainer teacher influence on the education and pedagogical concept of the future teacher. The issue discusses aspects related to the way how the interviewed teachers perceived their lived experiences on their education and these experiences allowed them to learn and accomplished their interpretations of what they consider being a good teacher. From these influences, it was possible to build their own identity while teachers, motivating them, or not, in the professional choice.

The main factors which motivated the teachers' professional choice in the Math area are related to the influence of a "good teacher". For Cunha (2012), the good

teacher is that one who transmits the contents with clarity, revealing domain and area knowledge.

The past teachers were remembered by their knowledge and content domain they represented, as well as the planning they used to do. Among the teachers interviewed on this study case five teachers have positive references and they were identified as significant to work as a teacher, whose explanations are different from each other:

*The class was always **planned**.* (Teacher E).

*The teacher always brought well organized PowerPoint slides with the themes and concepts. He used to relate the concepts with the authors and that action used to draw my attention, I used to learn a lot from his classes, he used to say nice things, **I always enjoyed what he used to do in class**.* (Teacher F).

*I wanted to be a mirror of my advisor, not only how he used to teach concepts, but his **class planning and organization**, and how I used to understand a class should be.* (Teacher B).

*Being the same as my college professors, **knowing the content** how they used to know and being in a classroom **to be called teacher**.* (Teacher C).

*[...] I always mirrored in some college professors, but I think I started shaping myself, you know? **I always tried to catch the best of each professor or classmate as well**.* (Teacher D).

For the trainer teachers, the manner how their professors developed the class had a considerable importance on the teaching exercise preparation. This was seen in the narratives about their best learning experiences during the course and the relevance related to the planning presentation of their teachers. For them, the teacher importance also occurs not only by the content domain, but in using strategies and interactions in class.

In his narrative, teacher B asserts that he selects what he can copy from the former professors and from his current co-workers, highlighting only the positive aspects in this learning process and, this way, improving and “shaping” his practice while being a teacher.

Teacher B asserts that his former professor used to problematize the option for the teaching career, justifying the low pay problem of this profession:

*Also some teachers used to tell me: - Do not be a teacher, because **teachers make a little money**. Today I teach my students about my passion for the teaching area, even knowing the student may face the low pay problem.* (Teacher B).

This situation makes us to consider the admission in the teaching career, for many graduates, it is a moment of doubts and anxieties. It can be seen on this statement that the lack of incentive does not change Teacher B’s decision related to his teaching option. It is known, however, situations like this may redefine the option for the profession, mainly on the Basic Education, in view of the work conditions and the little professional appreciation.

Another observed fact on the other trainer teacher statement refers to the fear of entering a classroom while being a teacher on the Basic Education, whose idea, however, changed from his education:

***Actually, I did not want to be a Math teacher for Elementary and High School, I always enjoyed Math a lot because it was always easy for me, I used to learn by myself in High School, but I was always afraid of teaching, of managing a class, of being in charge of the students, and the students' bad behaviors, even being in love with Math and it was through my teachers that I started losing this fear.*** (Teacher E).

This fact needs to be considered in the initial education, because the class is also a place where people handle the life histories of each other, demanding the teacher, besides the content domain, domain of the other knowledge which involves management, personal relations and etc. That is why, the graduates' necessity to be, in fact, ready for the reality of his future profession, understanding it, questioning it, following more experienced subjects from the problematized experiences in the education course is necessary. In that sense, the initial education needs to allow the reflective thinking exercise guiding to a political view which allows the choice for the teaching profession based on the graduated independence where the trainer provides effective actions related to the choice and the profession possibilities.

Other narratives reinforce the importance of actions which reflect in the profession choice:

***Some teachers were very good. [...] They had appreciation for the profession, they used to involve the students in projects and activities beyond classroom.*** (Teacher B).

***I had inspirational teachers, some of them used to know a lot, they used to relate concepts, when I was in that class I always wanted to be there studying a lot, I felt like studying it, it motivated me to be in class. [...] Some teachers motivated me to get involved in other activities, I got a scholarship and became a tutor, these activities kept me involved until the end of the graduation and helped me on the profession.*** (Teacher E).

These inspirations are built during the whole educational time, providing the mobilization of different knowledge. Thus, among the searches and the teaching professional thoughts and mobilized knowledge, the teacher's knowledge enlisted that, according Tardif (2012), it serves as a basis for the teaching, does not limit to the circumscribed contents which depend of a specialized knowledge, it covers the object diversity, issues and problems which are related to his work.

For Cavalcante (2011), the initial education cannot be a model of limited teaching:

***If a future teacher goes through an initial education process which does not fill the emerged blanks from his aspirations and needs for the teaching, he limits himself on the professional practice inside a school in a very vulnerable condition and way more susceptible to criticism and mistakes, becoming a mere reproductive model of a limited teaching for the promotion of his students' citizenship and autonomy.*** (CAVALCANTE, 2011, p. 18, our emphasis)

It is understood the graduation courses have a critical role on the profession socialization and on the constitution construction of Basic Education teachers. The teachers' education policies need to be articulated with the education proposals and professional development which will be built. Promoting the teaching career



valorization is needed to consider the contexts, the demands and the knowledge which qualify the teacher's action. Tardif (2012, p. 21) asserts: "Teaching is enlisting a wide variety of knowledge, reusing it at work to adapt it and to change it by and for the work".

This way, the data related to the trainer teacher mirroring indicate the possibility of producing knowledge about the teaching from the aspects related to the manner how the trainer teachers perceive lived experiences on their education, allowing the trainer teachers to build their own identity while teachers, motivating them on the professional choice. According to Placo and Souza (2006), the role a trainer teacher performs is very important because it is a mirror for the other, implying on the manner of learning, knowing and making, whose reflexes can instigate, confirm, deconstruct, reveal, provoke and reinforce. The path, while graduated ones from different trainer teachers, may elaborate some models which have the purpose of reproducing, rejecting or remodeling.

So, the trainer teacher, regardless the expertise, needs to promote a continuous construction of meaning as its application and validity, because the manner and the ways of conducting on the initial education end up deepen to the knowledge setlist of the graduated which will tend to reproduce them in class. The trainer teacher has strong influence on the decision making over the profession the future teachers will develop and their practices. Cruz and Marcel (2014) assert that the trainer teacher is reference for the future teachers because he is that one the students consider as an example of teaching practice and for the future professional practice. So this is an intentional choice based on the teaching practices of those teachers who stand out in quality related to others.

### **Disciplinary knowledge – a guide for the future teacher acting**

The second focus - "disciplinary knowledge: a guide for the future teacher acting" is about the knowledge object domain, and it considers the trainer teachers scored his relation with the knowledge object as essential for his option in being Math teacher. According to Conti et al. (2016) it is in the teaching field that the teacher constitutes and identifies himself professionally speaking. This category reunites information about the way as the trainer teachers show the expressive relevance of the specific area knowledge and its transformation in object of knowing how to teach is mobilized and definers for the teaching option. Some narratives will be listed now and they indicate how valued is the relation between the trainer teachers and the specific object:

***I wanted to have a Mathematical domain, simply to try on the job contest or to enable the acting in other area which was not education. (Teacher A).***

***I liked Math a lot, that is why I tried to study on the graduation course, it was very easy for me to learn the contents, I was always delighted with the calculations and demos, the way the professor used to domain the concepts, he had everything in his mind. (Teacher B).***

***I was always delighted with some of my Math teachers. I wanted to be like them, they knew a lot about Math, I perceived they had domain to teach and to fill the blackboard with numbers and formulas. (Teacher D).***

Knowing the specific content to be taught was mentioned as significant by the trainer teachers who value the content knowledge from their teachers a lot, besides, the facility they had with this knowledge object.

There are some questions about the meaning of content domain which is a reference for the future acting of the teacher. Many times having the content domain does not mean teaching for the students effectively to learn. It is, however, necessary condition for the teacher to domain the discipline he proposes to teach. Without dominating the knowledge area it is impossible to drive the class, the teaching and learning process. The teacher's acting involves more than just the domain because his activity covers the class management, the way the student learns, how he transforms the knowledge object in a reason to teach and learn. In this sense, the graduation courses need to provide meaningful activities for the alumni, in order that the concepts are learned and, at the same time, taught to their future students in Basic Education when in professional activity.

It is inferred from these trainer teachers' stories that teaching does not limit to repost information because like Teacher A indicates: "*there was a lack of experiences about the practice, about how to teach, it was only theory*", for many times the courses only dedicate themselves to explain theories but they end up warding off from the professional practice. Or better, they do not problematize the practice from the theory or they need theory to understand a practice. Curi and Pires (2008, p. 163) argue that:

[...] it is necessary to expand the discussions over the contributions the pedagogy, education sciences, didactics may bring for the consideration over the educational problems of the world today and for the constitution of teaching "professionalism". In the Math graduation courses the alumni approach with these knowledge areas is not done in a proper way; it is done by the means of approaches sometimes overly theoretical, without bonds to the alumni's specialty – in the case, being a future math teacher.

The fragment asserts callsigns aimed by the trainer teachers:

*In our area (Math) I see there is a lot of uniqueness, the person only knows Math a lot, but he only knows about it, but it is needed more, he needs to read Philosophy, to read History, it is needed to know beyond Math.* (Teacher E).

The trainer teachers while teachers also assert there was a lack of basement in the pedagogical disciplines, as well as approach with the Basic Education work field. It stands out the little reference they had in the disciplines related to the didactic and pedagogical knowledge, and, even knowing the teacher had content domain, he still lacked the relation theory – practice.

*In my point of view there was a lack of basement in the pedagogical disciplines in the course, a better approach with the work field.* (Teacher F).

*Many times theory was predominating, the teacher knew a lot but there was a lack of practice, and the didactic disciplines were very superficial.* (Teacher D).

*The teacher knew the content a lot, but **he did not relate it to practical situations**, of how to teach, he just used to say how he did in theory. In theory everything was alright. (Teacher E).*

In the trainer teachers' views, for many times the teacher has a great knowledge of his discipline but he does not know how to teach. In the trainer teachers' classes, specific or pedagogical classes the centrality was expository lessons. Regardless of the discipline it is necessary to offer condition of element appropriation which will constitute the necessary teaching knowledge for, besides domaining the specific knowledge, the teacher may change it into teaching/learning knowledge.

Other reference to the pedagogical disciplines is the lack of experiences and practices shown on the teacher A's talk. This trainer teacher, however, shows other acting perspective:

*In didactic disciplines the teachers simply worked with different manners of teaching, sometimes reading PowerPoint slides, then they did not work the way they wanted us to do, **there was a lack of practical examples, it was just theory. Today I try to do the opposite**, I try to teach my students to think and act like teachers. (Teacher A).*

It is needed to say that these trainer teachers, although had given a great relevance to the contribution of disciplines related to the Math scientific knowledge, also assert that such fact is not enough. It is inferred by the narratives that even having profound knowledge of specific contents, the pedagogical disciplines did not handle the pedagogical knowledge, in example, the way and the reason of teaching determined disciplinary content creating in the students the real learning.

Related to what was exposed, the trainer teachers indicate, yet, that Math cannot be taught alone, because it is not enough to think it like autonomous and inapplicable to the historic and social knowledge contexts. Math constitutes of multiple languages of definitions and concepts, attitudes and practices and, mainly, ways of thinking and interpretation which keep on building and developing along the History and mankind evolution, simultaneous to the development of different knowledge fields which structure the undergraduate syllabus. The trainer teachers assert that:

*The teacher **needs and has to discuss about the syllabus**, needs to **discuss about politics**, discuss about which are the social relations in a **Capitalist** world and these discussions need to be brought to class. (Teacher F)*

*Besides the strong mathematical knowledge, **it is needed readings and studies of the pedagogical part, theories**. (Teacher E).*

*In this idea of **discussing politics**, many teachers say: what discuss about politics for? Why study this kind of theme? Why study syllabus? **But all if these takes part of the teachers' education**. (Teacher C).*

It is needed to organize the graduation syllabus so that in fact it problematizes the knowledge object considering the teaching know-how and the student's learning in Basic Education. It is worth saying that it is necessary the knowledge transformation between the specific knowledge movement and the teaching know-how, demanding from the teacher specific and pedagogical knowledge. For Shulman (1987), the pedagogical knowledge covers the comprehension of the way that determined

discipline can be transposed to the scholar knowledge. For Bolzan (2006, p. 357) the pedagogical knowledge is characterized

[...] by the theoretical and conceptual knowledge, besides the knowledge of teaching practical layouts – pedagogical strategies, didactic assistance routines and the teachers' experience layouts. It is referred to the institutional or scholar knowledge which constitutes by the specific knowledge belonging to the culture.

In the trainer teachers' narratives clues can be found and they allow to indicate characteristics of this knowledge transformation:

**[...] Taking a pedagogical attitude also means taking this knowledge in a way the student [graduating] understands. It is not enough just to domain the content. It is needed the pedagogical attitude, worrying if this knowledge the teacher elaborated is didactic, if the student is really learning. I understand the content knowledge and the pedagogical knowledge need to be together.** (Teacher E).

When asked about the way they used to start a teaching activity, the teacher A asserted that at the beginning he tried to follow his college teacher example. He emphasized the content appreciating the scientific field knowledge he graduated. He made it clear that just this kind of knowledge was not enough because he had a lack of experience, in example, there was a lack of knowledge and experience in the future professional performance, a lack of critically thinking and acting about the future acting of being a teacher.

**As I had studied pure mathematics, everything I had learned I wanted to teach my 7th and 8th grade students at the time, now it is annually, 9th grade. So I used to approach deducting formulas. I used to think I was being very good, today I always tell it to my graduation students. I used to think I was being very good, but as my students were most in Elementary school, they did not learn and rejected math. Can you imagine me deducting theorems? It was crazy. This is lack of experience, I was teaching what I learned in graduation.** (Teacher A).

From this narrative it can be inferred that, many times, when entering the teaching area, the teacher still nurture the reproduction role, better saying, he maintains the emphasis and centrality in the area content in which he graduated and in the way the content was taught in the graduation course, having as support specific disciplines. This experience in Higher education for many times does not consider the teacher needs to learn how to teach and this will be his effective action while being a Basic Education teacher.

It is not difficult to find Math teachers who teach the discipline emphasizing the contents, prioritizing the deduction utilization of formulas and demos, whose teaching method constrains to expository classes. This teacher's attitude, even knowing the content, creates understanding among the alumni in the teaching process as a mere memorization, discouraging elaborated activities which involve reasoning, investigation process, contextualization, prioritizing the way as a student learns the teaching object. This fact refers to the content transmission, in example, the teacher "transmits" and the students "receive".

Belo (2012) points that the teaching education and the peculiarities in working with the math teacher education for the Basic Education needs go to beyond the reproduction of its teachers' practices:

It is understandable to expect most of the trainer teachers reproduce their trainer teachers' practices, or experiences they judge as appropriate for the activity developments. And they understand that graduating a good math teacher is enough because these teachers know the content and know how to instrumentalize the practices and the appropriated methodologies. This way, they can contribute for the problem in the teaching/learning system occurrence because they are emphasizing the mathematical specific knowledge, the future teachers have a great chance of reproducing in their Basic Education classes the same practice, the content by the content, generating difficulty on learning math. (BELO, 2012, p. 140)

Paiva (2013, p. 92) contributes to this perspective asserting that it is critical for the teacher "knowing why he teaches, what he teaches for, who he teaches and how he teaches is essential to do in class". Shulman (1986) points the importance of specific content knowledge among those the teacher must have. In the narratives it is possible to verify that the reference teachers for the trainer ones used to domain the content knowledge. The narratives, however, also check the importance in going beyond the specific knowledge because it needs to substantiate the pedagogical actions, it must overcome the expository classes. For Shulman (1986) the teacher needs to have the capability of changing the content, in example, the pedagogical knowledge of the content differs the teacher of a determined discipline from an expert of the same syllabus component, a math teacher from a math expert. Beyond the acting area knowledge domain it matters to the teacher to understand the possible ways of teaching and how effectively the students learn.

In this sense, Tardif (2012) argues that the education for the teaching must be rethought considering the teachers knowledge in Basic Education – called "Profession teachers" - and the specific realities of their daily work. It seeks the articulation and the balance between the produced knowledge in Higher Education institutions and the developed knowledge by teachers in their daily practices.

For Conti et al. (2016) the teachers knowledge are intrinsically related to the teachers work, like planning, didactic strategies, mediation, among others, and they have direct influence on the teachers professionalization. For the authors it is at the teachers work that the appropriations and the ways of being and act at work consolidate.

It is confirmed, this way, the importance of relations that the trainer teachers establish with the professional knowledge in the workplaces and in the knowledge relations. Consequently, a graduation that creates concrete practices and narrows relation between professional practice and the theoretical education is defended, in order to influence significantly the education of new math teachers.

## Final Considerations

From the data analysis, the influence of trainer teacher in the teaching/learning process as reference in the teaching action in Higher Education can be identified. Fiorentini (2005) points that beyond the specific discipline, the teachers teach a

way of being person and teacher. It is necessary, however, to discuss this process of being a teacher, posing as such and educating new teachers, while researches show the significant influence of the trainer teacher in the teaching constitution.

The trainer teacher who graduates other teachers, when accomplishes his teaching activity, has responsibility on this education, in example, with the future work that this teacher will develop because the graduated students use the models, positive or negative ones, for the professional exercise. In this step some determined habits will be generated and they will focus at the professional exercise. Responsibility, therefore, is related to the teaching professional constitution because the teacher has key role on the future teachers' knowledge construction.

According to André (2012) the graduation courses can become identification places with the profession and the professional knowledge construction, but they underline the necessity of syllabus review. Gatti (2010) considers that even the National Guidelines point to the articulation between pedagogical and specific dimension at the teacher education courses, these could not achieve the dialogue process among the dimensions.

It is perceived, this way, the teaching education demands commitment and competence to be reference of the future teachers. The way of teaching needs to be rethought in every discipline which permeate the graduation course syllabus. It is not enough, therefore, to know the contents of the specific disciplines, but the pedagogical ones also need to be reassigned considering the action field and the syllabus which emphasize the knowledge object, in a historical, cultural, epistemological or didactically approach. This comprehension must gather the action of all the disciplines in a Math graduation course.

Finally, the alumni education needs to be other in terms of syllabus and actions on the different disciplines which take part of the initial education. The discussion over this subject is not over, but it is opened for future researches and, mainly, for graduation course syllabus reviews considering the new Syllabus Guidelines for Basic Education Teacher Education (BRASIL, 2015). In this perspective it is proposed to deepen the comprehension of practice performed by the teachers who graduate Basic Education teachers.

## References

ANDRÉ, Marli. O trabalho docente do professor formador e as práticas curriculares da licenciatura na voz dos estudantes. In: SANTOS, Lucíola; FAVACHO, André (Orgs.). **Políticas e práticas curriculares: desafios contemporâneos**. Curitiba: CRV, 2012. p. 35-49.

BELO, Edileusa do Socorro Valente. **Professores formadores de professores de matemática**. 2012. 150f. Dissertação (Mestrado Acadêmico em Ciências e Matemática) – Universidade Federal do Pará. Belém, 2012.

BOLZAN, Doris Pires Vargas. Verbetes. In: MOROSINI, Marília (Org.). **Enciclopédia de Pedagogia Universitária**. Glossário. Brasília: Instituto Nacional de Estudos e Pesquisas Educacionais Anísio Teixeira, 2006, v. 2. 610p.

BRASIL. Conselho Nacional de Educação. **Resolução CNE/CP nº 02/2015, de 1º de julho de 2015**. Define as Diretrizes Curriculares Nacionais para a formação inicial em nível superior (cursos de licenciatura, cursos de formação pedagógica para graduados e cursos de segunda licenciatura) e para a formação continuada. Brasília, Diário Oficial [da] República Federativa do Brasil, seção 1, n. 124, 2 jul. 2015. p. 8-12. Disponível em: <<http://pesquisa.in.gov.br/imprensa/jsp/visualiza/index.jsp?data=02/07/2015&jornal=1&pagina=8&totalArquivos=72>>. Acesso em: 12 abr. 2016.

CAVALCANTE, Nahum Isaque dos Santos. **Formação inicial do professor de matemática: a (in)visibilidade dos saberes docentes**. 2011. 139f. Dissertação (Mestrado Profissional em Ensino de Ciências e Matemática) – Universidade Estadual da Paraíba. João Pessoa, 2011.

CRUZ, Giseli Barreto; MARCEL, Jules. A didática de professores referenciais e suas contribuições para a formação docente. **Estudos em Avaliação Educacional**. São Paulo, jan./abr. 2014, v. 25, n. 57. p. 56-82.

CUNHA, Maria Isabel. **O bom professor e a sua prática**. 24. ed. São Paulo: Papirus, 2012.

CURI, Edda; PIRES, Célia Maria Carolino. Pesquisas sobre a formação do professor que ensina matemática por grupos de pesquisa de instituições paulistanas. **Revista Educação, Matemática e Pesquisa**. São Paulo, 2008, v. 10, n. 1. p. 151-189.

DONATO, Maria Ermelinda. Inovações na formação de docentes universitários: a experiências das ciências veterinárias. In: CUNHA, Maria Isabel da (Org.). **Reflexões e práticas em pedagogia universitária**. Campinas, SP: Papirus, 2007.

FIORENTINI, Dario. A formação matemática e didático-pedagógica nas disciplinas de licenciatura em matemática. **Revista de Educação**. Campinas, SP: Programa de Pós-Graduação em Educação, jun. 2005, n° 18. p. 107-115.

GARNICA, Antônio Vicente. História oral e educação matemática: de um inventário a uma regulação. **Zetetiké**. Campinas, 2003, v. 11, n° 19. p. 9-55. Disponível em: <<http://ojs.fe.unicamp.br/ged/zetetike/article/view/2489>>. Acesso em: 4 set. 2016.

GATTI, Bernadete. Formação de professores no Brasil: características e problemas. **Educação & Sociedade**, 2010, v. 31, n° 113. p. 1355-1379.

IMBERNÓN, Francisco. **Formação docente e profissional: formar-se para a mudança e a incerteza**. São Paulo: Cortez, 2004.

LEITE, Yoshie Ussami Ferrari. **O lugar das práticas pedagógicas na formação inicial de professores**. São Paulo: Cultura Acadêmica, 2011.

CONTI, Keli Cristina; CARVALHO, Dione Lucchesi; CARVALHO, Carolina Fernandes de. Desenvolvimento profissional de professores potencializado pelo contexto colaborativo para ensinar e aprender estatística. **Revista Eletrônica de Educação**, 2016, v. 10, n° 2. p. 188-202. DOI: [dx.doi.org/10.14244/198271991439](https://doi.org/10.14244/198271991439)

MORAES, Roque; GALIAZZI, Maria do Carmo. **Análise Textual Discursiva**. Ijuí, RS: Ed. Unijuí, 2007.

NÓVOA, António. Para una formación de profesores construida dentro de la profesión. **Revista de Educación**, 2009, v. 350. p. 203-218.

PAIVA, Maria Auxiliadora Vilela. O professor de matemática e sua formação: a busca da identidade profissional. In: NACARATO, Adair Mendes; PAIVA, Maria Auxiliadora Vilela. (Orgs.). **A formação do professor que ensina matemática: perspectivas e pesquisas**. 3. ed. Belo Horizonte: Autêntica, 2013. p. 89-112.

PLACO, Vera Maria; SOUZA, Vera Lúcia (Orgs.). **Aprendizagem do adulto professor**. São Paulo: Loyola, 2006.

ROLDÃO, Maria do Céu. Função docente: natureza e construção do conhecimento profissional. **Revista Brasileira de Educação**. Rio de Janeiro, jan./abr. 2007, v. 12, n° 34. p. 94-103.

ROLDÃO, Maria do Céu. Formação de professores, construção do saber profissional e cultura da profissionalização: que triangulação? In: ALONSO, Luísa; ROLDÃO, Maria do Céu. (Coords.). **Ser professor do 1º ciclo: construindo a profissão**. Coimbra: Almedina, 2005. p. 13-25.

SACRISTÁN GIMENO, José. Consciência à ação sobre a prática como libertação profissional dos professores. In: NÓVOA, António. (Org.). **Profissão professor**. Porto: Porto Ed., 1995. p. 63-92.

SHULMAN, Lee. Those who understand: knowledge growth in teaching. **Educational Researcher**, 1986, v. 15, n° 2. p. 4-14.

SHULMAN, Lee. Knowledge and teaching: foundations of the new reform. **Educational Review**. Harvard, 1987, v. 57, n° 1. p. 1-22.

SHULMAN, Lee. Conocimiento y enseñanza: fundamentos de la nueva reforma. **Revista de currículum y formación del profesorado**, 2005, v. 9, n. 2. Disponível em: <<https://www.ugr.es/~recfpro/rev92ART1.pdf>>. Acesso em: out. 2016.

SOUZA, Cirlei Evangelista Silva. **Formadores de professores no ensino superior: olhares para trajetórias e ações formativas**. 2011. 330f. Tese (Doutorado em Educação) – Universidade Federal de Uberlândia. Uberlândia, MG, 2011.

TARDIF, Jean; FAUCHER, Caroline. Um conjunto de balizas para a avaliação da profissionalidade dos professores. In: ALVES, M.; MACHADO, E. (Org.). **O pólo de excelência: caminhos para a avaliação do desempenho docente**. Porto: Areal Editores, 2010. p. 32-53.

TARDIF, Maurice. **Saberes docentes e formação profissional**. 13. ed. Petrópolis, RJ: Vozes, 2012.

TEIXEIRA, Fabiana Cristina. **A construção dos saberes docentes por professores formadores**. 2012. 127f. Dissertação (Mestrado Acadêmico em Educação) – Universidade Federal de Viçosa. Viçosa, MG, 2012.

Nota: Parte dos resultados apresentados neste artigo foram comunicados no XXIV Seminário de Iniciação Científica, UNIJUÍ, 2016 e publicado nos anais do evento Salão Do Conhecimento UNIJUÍ.

Sent on: January 6th, 2017

Approved on: December 20th, 2017