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THE 'EMERGENCY' OF RESEARCH ON THE BEGINNING OF THE CHEMISTRY TEACHER CAREER

ABSTRACT

The beginning of the teaching career is an important phase, encircled by tensions, insecurity, fear and isolation that influence both the practice and teaching habitus (consolidation of addictions, traumas and ways of being) and the permanence of the profession. In this article, we intend to discuss the main aspects that permeate the early years of the teaching career in Chemistry, as this is a line of research that needs greater dissemination among teacher trainers and the school community, who play a fundamental role in providing personal and professional support to beginning teachers. Furthermore, we believe that it is up to the degrees to provide subsidies - theoretical and practical - that support the reflection-action of teachers at the beginning of their careers. It is this theoretical security, based on quality and critical reflection, that allows the recent graduate to assume that theory and practice are inseparable, as well as to better control and face adverse situations, emotions and dilemmas experienced during this period.

Keywords: Beginning of the teaching career. Beginning Chemistry Teachers. Teacher training.

A 'EMERGÊNCIA' DAS PESQUISAS SOBRE O INÍCIO DA CARREIRA DOCENTE EM QUÍMICA

RESUMO

O início da carreira docente é uma fase importante e permeada por tensões, insegurança, medo e isolamento que influenciam tanto a prática e o *habitus* professoral (consolidação de vícios, traumas e modos de ser e estar) quanto a permanência na profissão. Neste artigo pretende-se discutir os principais aspectos que permeiam os anos iniciais da carreira docente em Química, visto que esta é uma linha de pesquisa que necessita de maior divulgação entre formadores de professores e a comunidade escolar, os quais desempenham papel fundamental de apoio pessoal e profissional aos professores principiantes. Além disso, acredita-se que cabe às licenciaturas fornecer subsídios - teóricos e práticos - que deem sustentação para a reflexão-ação dos docentes em início de carreira. É essa segurança teórica, pautada na reflexão de qualidade e crítica, que permite ao recém-formado assumir que teoria e prática são indissociáveis, assim como controlar e encarar melhor situações adversas, emoções e dilemas vivenciados nesse período.

Palavras-chave: Início da carreira docente. Professores iniciantes de Química. Formação docente.

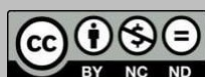
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1 THE BEGINNING OF THE TEACHING CAREER

*"Nobody starts to be an educator on a Tuesday at four in the afternoon.
Nobody is born an educator. We become educators [...]"*

FREIRE (1991, p.58)

Research about teaching initiation appeared in the mid-1970s, but they intensified with the 21st century school cultures scenario (CUNHA; BRACCINI; FELDKERCHER, 2015). These studies are carried out, mainly due to beginners' socialization difficulty, the problem of teachers giving up their career in the early years, and from the understanding/overcoming that the initial/academic training, associated with the actual practice at schools is not always enough to ensure answers to educational events. This also demonstrates that the teaching profession is highly complex, far from being a prescriptive act.

Some authors stand out as pioneers in said field, such as: Lortie (1975); Johnston; Ryan (1983); Veenman (1988); Silkes (1989); Marcelo Garcia (1998); Huberman (1995); Mizukami (1996); and Lüdke (1996). It's important to clarify that the last two researchers mentioned work in Brazil.

Professionally entering in the teaching career starts to be understood as an important phase for the professional constitution of teaching, as well as staying in the field. If the focus of early research on teaching initiation is on understanding the aspects that go through this phase, such as the first years of practice impacts on beginners and socialization among peers in the school context, the concern about professional development unleashes a second focus of research and actions, like follow-up/insertion/induction programs aimed at new teachers.

From the initial experiences in the profession, the teacher realizes that the teaching role is not simple and that this starting phase in the career is a period of tensions and intense learning (BORKO, 1986 apud MARCELO GARCIA, 1999). It is a period of experiences permeated by a lot of feelings, emotions and enthusiasm, but also some apprehension and anxiety regarding the new assumed responsibilities (FLORES, 1999).

Tardif and Raymond (2000) claim that, due to adapting to the new work reality, the initial phase in the career is characterized as a critical moment in the teacher's professional development and can influence completely on the type of teacher the beginner might become. An expression commonly used by several authors to represent

the beginners' difficulties, spread mainly by Veenman (1988), is "a reality shock". Another expression also used to express the teacher's entry in the career is "falling into" school, which alludes to the lack of correspondence between initial training and the reality of work practice. The latter, on the other hand, can make the beginner feel like theories, methods and reflections learned at college are fading, so there is little contribution from the formative stage to their later professional practice, which may lead them to underestimate, or even ignore academic knowledge. In this context, it is expected that they feel alone, intensifying harsh feelings, such as fear and insecurity (CORRÊA, 2013; PENA, 2010).

As Marcelo (2009) puts it, the beginning of the teaching career is an intense period of tensions and learning, generally undervalued, in which new teachers acquire professional knowledge beyond those capable of maintaining a certain personal balance. To said author, professional insertion programs, among which pre-graduate and post-graduate programs are pointed out, are real alternatives to certify that the first years as teachers are not years of frustration.

According to Gonçalves (1995), the beginning and the end of professional life are considered by teachers as the worst years of their careers. Veenman (1988) showed that both experienced and new teachers may occasionally complain about the same difficulties, but what varies is the degree of depth in which the dilemmas are felt and their impact on the educator.

Due to the intensity of experiences at the beginning of their careers and the complex network of situational factors, beginners can experience significant changes in their behaviour: if while training they were progressive and liberal in their attitudes towards the students education, they soon experience a change, becoming more traditional, conservative and vigilant when they move forward in teaching practices in their first years of professional practice (VEENMAN, 1988; FEIMAN-NEMSER, 2001).

Veenman states that (1988, p.42): "[...] no institution for teacher education can be indifferent or ignore the problems that its graduate students come across in their first years of practice [...]". Flores (2009) suggests that understanding that initial teachers are in a learning stage, when facing the teaching duties autonomously at the beginning of their careers "[...] can be translated into an unrealistic optimism by those who have responsibilities with teacher training" (FLORES, 2009, p. 96).

Confirming the above, the report of the Organization for Economic Cooperation and Development (OECD, 2005, p. 13) also strengthens the fact that "[...] the stages of initial

training, insertion and professional development should be connected a lot more to create a coherent learning and a development system for teachers". With the success of programs for induction/insertion of teaching in the career, the establishing of these stages has become an object of interest in educational research, revealing new perspectives on training, professional development and teacher identity fields.

The induction/insertion programs represent a "[...] link between the initial training and the teacher's professional practice. [...] on the one hand, the initial training processes limitations and, on the other, the characteristic difficulties of the beginning of the teaching career." (MIZUKAMI; REALI, 2019, p. 114). The first induction/insertion programs were developed decades ago in the United States, Canada, England and France. Afterwards, several countries such as Portugal, Spain, Israel, Argentina and Chile, adopted them with proven efficiency in supporting teachers during this period and providing systematic and intensive support for their professional development (MARCELO GARCIA, 2009).

In South America, insertion program initiatives emerged in Argentina (ZABALLOS, 2009) and Chile (ABARCA, 2009; 1999), in the late 1990s and early 2000s. Abarca (1999) states that the initial teacher's problem is an object to be built in Latin America. Bernadete Gatti, in the lecture given at the III Congreso Internacional sobre Profesorado Principiante e Inserción Profesional a la docencia, held in Santiago del Chile (2012), said: "[...] it still isn't perceived in Brazil the consolidation of more generalized policies, regarding the teacher who starts their career in teaching" (PENA, et al. 2014, p. 3).

In this matter, research on early-career teachers and insertion/induction programs are important to provide personal and professional support to teachers, in coping with early career experiences, as well as to contribute to their personal development and, as a consequence, improving the education quality. Research on the beginning of the teaching career, as well as induction/insertion programs are primary in Brazil, and few are dedicated to the field of Chemistry.

The lack of publicity about research on the beginning of the teaching career in the Chemistry teacher education field makes it difficult to recognize the dilemmas of this phase, its impact on the teachers' permanence and professional development, as well as the lack of preparation and personal and professional support required for early career Chemistry teachers. Given the above, this article aims to discuss the main aspects of the teaching career beginning, especially in the Chemistry subject.

2 METHODOLOGICAL PATHS

A product of the Research Group in Education in Chemistry of Araguaia - GPEQA (UFMT), - registered with the National Council for Scientific and Technological Development (CNPq), this article is a study carried out from a bibliographic review on the beginning of the teaching career, both nationally and internationally, and the survey and analysis of Brazilian publications (dissertations and theses) published until the year 2020 about beginners in the Chemistry field.

Researches with characteristics that systematize and evaluate the production of knowledge in a given field for a given period are characterized as a state of art literature review study (MEGID NETO, 1999).

The term state of art is the result of the literal translation from English, and, according to Brandão (1986 apud ROMANOWSKI; ENS, 2006), it has the “[...] objective to carry out surveys of what is known about a given subject from research carried out in a certain area” (p.40). Research using this methodological strategy is not restricted to identifying the production [literature review], but also analyzing it, categorizing it and unfolding different approaches and perspectives (ROMANOWSKI; ENS, 2006).

This investigation was carried out in two stages: the first part was a quest for research on the beginning of the teaching career and insertion/induction programs in the scope of national and international literature, and the second consisted of a search for dissertations and theses referring to the beginning of teaching career in Chemistry, defended in Brazil from 2010 to 2020. It is worth mentioning that the time period chosen in this article is an expansion of the mapping research carried out by Silva and Queiroz (2016) between the years 2001 to 2010 in Brazil.

From the dissertations and theses analyzed by Silva and Queiroz (2016), two dissertations were identified as belonging to the Chemistry area, however, one of them was related to teaching initiation at PIBID (Institutional Program for Teaching Initiation Scholarships). Thus, it is considered only one dissertation focused on the Chemistry teachers field, at the beginning of their career, published in the period highlighted by said authors.

The search carried out in the second stage, from 2010 to 2020, took place on the website of the Digital Database for Theses and Dissertations (BDTD)¹ and on the Academic Google website, using the keywords: beginner Chemistry teacher and career

beginning. From the papers analyzed, those related to research on Chemistry teachers at the beginning of their careers were selected, through titles and abstracts reading. Issues related to PIBID and related projects were ruled out, as we consider that the beginning of the career, before the conclusion of initial training, happens with specification and does not represent the experiences of the period of interest, in its totality of aspects.

3. RESEARCH ON INITIATION OF THE TEACHING CAREER

Some publications focused on the beginning of the teaching career stand out in the 1980s, 1990s and 2000s, with the books *'The Education of Teachers'*, organized by Howey and Gardner (1983) - United States; *'Perspectivas y Problemas de la función docente'*, organized by Villa (1988) - Spain; *'Teacher's Lives and Careers'*, organized by Ball and Goodson (1989) - England; *'Vidas de professores'*, organized by Nóvoa (1995) - Portugal; *'Formação de professores e tendências atuais'*, organized by Reali and Mizukami (1996) - Brazil; *'Handbook of Research on Teacher Education'*, organized by Sikula, Buttery and Guyton (1997) - United States; *'História de vida del profesorado'*, organized by Goodson (2004) - Spain; *'Sobrevivências no início da docência'*, organized by Lima (2006) - Brazil; and *'El profesorado principiante: insércion a la docência'*, organized by Marcelo Garcia (2009) - Spain; among others.

In the Brazilian context, pioneer research on the beginning of the teaching career carried out by Professor Dr. Maria da Graça Nicoletti Mizukami, from the Federal University of São Carlos (UFSCar) is highlighted, who supervised several dissertations and theses related to the beginning of the career. As can be seen in Table 1, in the survey of theses and dissertations on the beginning of the career, published from 2001 to 2010 carried out by Xavier (2014), 50% of the publications from this period take place at UFSCar, that is, thirteen out of a twenty six total.

Table 1. Theses and dissertations published at BDTD about the beginning of career, published from 2001 to 2010

Field	Research Number	Institution/ Author
Pedagogy	13	1 UNEB - Salvador/BA - Lima (2006) 1 UFPE - Recife/PE - Soares (2004) 1 PUC-PR - Curitiba/PR - Pienta (2007) 1 PUC-RS - Porto Alegre - Souza (2013) 9 UFSCar - São Carlos/SP - Pieri (2010); Pizzo

		(2004); Rocha (2005); Voltarelli (2013); Longhini (2006); Migliorança (2010); Montalvão (2008); Nono (2005); Palomino (2009)
Math	3	1 UFSCar - São Carlos/SP - Carneiro (2008); 1 PUC-SP - São Paulo/SP - Tinti (2012); 1 UNICAMP - Campinas/SP - Gama (2007);
Various Specific Fields	3	1 UFSCar - São Carlos/SP - Moraes (2005); 1 UEL - Londrina/PR - Coelho (2009); 1 PUC-SP - São Paulo/SP - Knoblauch (2008);
Chemistry	2	2 UFU - Uberlândia/MG - Bedin (2012), Pena (2010)
Physical Education	2	1 UFSCar - São Carlos/SP - Ferreira (2005); 1 UEL - Londrina/PR - Costa (2012)
History	1	1 UNICAMP - Campinas/SP - Paim (2005)
English	1	1 UEL - Londrina/PR - Gaffuri (2012)
State of Art	1	1 UFSCar - São Carlos/SP - Mariano (2006)

Source: Xavier (2014, p. 53).

Research on teaching initiation is mainly developed due to the importance of this time of the career for teachers' development and professional constitution, since the beginning of the career experiences can deeply affect the beginners' concepts and practice. In addition, such research observe the concern about the significant career drop out rate, in the first years of practice, aspects and difficulties inherent to this phase, on the process of professional socialization with peers and school culture, monitoring/insertion/induction programs of new teachers and evaluation of these programs.

Next, some characteristics of this phase will be discussed, such as time boundaries and aspects and difficulties that influence new teachers, and also the insertion/induction programs for beginners.

3.1 Time Definition

The teacher's professional development is conditioned to different phases. Even before an aspiring teacher enrolls in the licentiate degree, different factors from their life and school experience are added up to the teacher constitution process. These experiences, especially those related to perceptions as a student, defined as environmental training, tend to be implicitly reproduced by teachers (MALDANER, 2003).

Although teacher formation assumes a *continuum*, as Tardif (2002) points out, becoming a teacher is a long and complex process with different career stages, understood as professional life cycles. These different stages have their own characteristics and influence the teacher in different ways (HUBERMAN, 1995). According to Huberman (1995), the phases of the teaching career can be divided as: entering the career, stabilization, diversification, questioning, serenity, affective distance, conservatism and lamentations.

Huberman (1995) claims that a career development is a process that should not be seen from a linear perspective, nor as a series of events. It is worth mentioning that these are not inflexible elements and therefore they are influenced by multiple factors - such as events that are internal and/or external to the profession - and the diffuse nature of a professional's life that is the person itself cannot be ignored. As stated by Nóvoa (1995), it is impossible to separate the professional self from the personal self; regarding the construction of the teacher's subjectivity, these aspects must be considered for the understanding of the teacher's being and acting.

About the definition of the period and time that characterize the beginning of the teaching career, there is no agreement among researchers in the area, due to several contextual and personal factors. Some authors consider that the beginning of the career occurs in the first years of practice, right after initial training, in a range that can last from three to seven years. According to Huberman (1995), the entry in a career represents the first two or three years of teaching. As for Tardif and Raymond (2000), the beginning of the career includes the first five to seven years of the path. Lima (1995) states that the beginning of the teaching career takes place between one and five years, and that at this stage teachers acquire fundamental experience that tends to become set, creating a personal style of teaching, the profession's knacks in *habitus* and in traits of the professional personality.

Some authors (PENA, 2010; LIMA et al., 2007; MARIANO, 2006; BEACH; PEARSON, 1998; MELLADO, 1998; KAGAN, 1992) discuss that the beginning of the teaching career may occur with some specificities, even before the graduation, because in this period, students can live the experiences characteristic of the career beginning, but with some particularities regarding the teacher who follows the profession, after getting their degree.

The particular features of students' livingness, given the experiences of the beginning of the teaching career, occur especially in the field of teaching and learning process, that is, interns do not experience the difficulties and influences of responsibility for the students' learning process. In addition, they do not experience the difficulties inherent to the process of professional socialization at the beginning of their career, as they do not feel the need to belong to the school's professional body or to the school culture (PENA, SILVEIRA, GUILARDI, 2010).

Although the internship can contribute to the student's debut in practice, minimizing the impacts, when the newly graduate teacher finds themselves totally responsible and alone in their classroom, certainly the experience of this formative stage will not exempt the beginner from experiencing the dilemmas of career, and can contribute so that the 'reality shock' described in the literature is not a paralyzing event, as it can also anticipate these experiences.

Therefore, it is necessary that both the interns and those involved (mentors, supervisors, principals, coordinators, among others), have knowledge about the theoretical and epistemological aspects of the initial phase of the teaching career to provide personal and professional support and the conditions for a less traumatic entry in the teaching career (PENA; ZANETONI; VÉRAS, 2021).

According to Marcelo (2009), insertion programs - in France, Greece, England, Northern Ireland and Italy - follow the test year of "beginning teachers", before they obtain their certification, that is, before completing graduation. They are exposed to the first year of their career, under supervision and counselling, and receive support and are supervised and evaluated by different people, such as: school principal, mentor, inspector, teachers from the initial training institution. After this period, they receive their certification to teach.

3.2. Aspects and difficulties that influence new teachers

All stages of the teaching career are important, but what it seems, according to the literature (CORRÊA, 2013; PENA, 2010; MARCELO GARCIA, 2009; LIMA, 2006; FLORES, 2004; FEIMAN-NEMSER, 2001; TARDIF; RAYMOND , 2000; GOODSON, 1995; MARCELO GARCIA, 1999) the initiation process in teaching is a period full of feelings of great insecurity and distress felt by beginners. The difficulties inherent of this period are experienced more intensely and can significantly influence new teachers in their

professional and personal constitution and, also, directly, in the constitution of the type of teacher they will become (GOODSON, 1995; FEIMAN-NEMSER, 2001; FLORES, 2004).

According to Lima (1996), early career experiences (from one to five years) constitute the fundamental experience, which, for the author, “[...] then tends to be fixed in a personal style of teaching, in professional knacks, in *habitus* and in professional personality traits” (p.61). For Corrêa (2013, p. 64), loneliness is another aspect of entering the teaching career, which leads the beginning teacher to solve their "problems" by leaning in beliefs and certainties that they believe to be correct, establishing them into addictions, throughout their practice.

Another extremely relevant factor to the study of the experiences of teachers at the beginning of their careers, as highlighted by Flores (2009), Feiman-Nemser (2001) and Gold (1997), is the influence that the first years of practice have on the beginner's continuity in the teaching career.

In addition, new teachers feel the need to be accepted by their peers and especially by students, which can trigger a lot of frustration at the beginning of their careers in the process that is called professional socialization (PENA; SILVEIRA; GUILARDI, 2010).

Veenman (1988) also highlights the existence of different factors that can contribute to the “reality shock” in new teachers. The first is the wrong choice of profession, which can lead to disappointment, failure, inappropriate attitudes and personal characteristics. Another factor pointed out is the improper professional training, which results in fewer teaching skills, combined with a problematic school lack of materials and resources, an unsuitable teaching staff, absence of clear established educational goals, isolation in the workplace, students’ parents who emphasize knowledge transfer, students' getting used to an authoritarian teaching style, variety of tasks that a teacher must complete.

It is known that sometimes the most difficult classes are designated to beginners, with students with learning difficulties (VEENMAN, 1988). Marcelo Garcia (1991 apud MARCELO GARCIA, 1999) conducted a survey with 107 teachers, using quizzes and interviews, and revealed some of the dilemmas that teachers at the beginning of their careers face, such as: time pressure, number of students, discipline issues, lack of information about the school, students and their motivation.

Valli (1992) identified in his study four dilemmas faced by teachers at the beginning of their careers: indiscriminate imitation, isolation, difficulty in exploring the knowledge acquired in initial training and the development of a concept of teaching that is more

technical. Beach and Pearson (1998) investigated the main conflicts that teachers in *preservice* (meaning a teacher who has not completed their initial training) experience at the beginning of their career. They identified four main types of conflicts and tensions: curriculum/instruction, personal relationships, self-concept, and institutional/contextual. According to Flores (1999), studies show that the main difficulties experienced by the teacher at the beginning of their career are fundamentally located in the educational plan, and also in discipline control, in class management, in students' motivation, in handling individual differences, evaluation and difficulties related to the lack or non-existence of educational material. Feelings of loneliness, insecurity, isolation, lack of teamwork between beginners and more experienced teachers and difficulties in working with different groups of students that learn at different pace, were conflicts identified by Guarnieri (1996).

Lima *et al.* (2007) verified that the most observed difficulties at the beginning of the career are related to maintaining discipline in the classroom and to the students' learning; another difficulty noted is the feeling of loneliness, which can be pointed out as one of the causes for teachers' discomfort and is mainly worsened by the lack of institutional support and the difficulties in the relationship with the students' parents. Mizukami (1996) identified the following aspects, considered as critical, experienced by the teachers participating in her study in the first years of their career: time management, class control, discipline, organization and following up subjects, the relationship with the students, subject mastery, different students' reading skills and their directory, and lesson planning for specific population sectors.

According to André *et al.* (2010), it is also necessary to consider that there are other aspects that directly and/or indirectly affect the teaching practice, however, it is noted that many of the dilemmas presented are common, even for different authors. In addition to introspective and personal factors, ongoing transformations in society or around the practice can influence the beginning teacher's behavior and feelings. For that matter, unexpected and/or sudden aspects, such as the COVID-19 pandemic, can also affect the homeostasis of teaching practice. So, new dilemmas change the way teachers from different stages of their careers face a new socio-educational scenario, mainly those whose consequences are still being unveiled (BECA; BOERR, 2020).

If before the pandemic teachers at the beginning of their careers were already experiencing dilemmas typical of this phase, in a solitary way - exempt of any type of

support or monitoring -, with social distancing, not experiencing face-to-face school life and adopting remote learning can and probably will bring new characteristics for professional entry (BECA; BOERR, 2020), becoming an important investigative niche for future papers.

Another extremely relevant element for the early career teachers' experiences study, as highlighted by Feiman-Nemser (2001), Flores (2009) and Gold (1997), is the influence that the first years of practice have on the beginner staying in the career. In their studies, Marcelo Garcia (1999) and Lima (2006) emphasise that the entry stage in the teaching career can strongly influence the constitution of the teacher's identity. This becomes a concern, as Tardif and Raymond (2000) state that it is in the introductory phase of the career that the teaching professional ends up building their practice.

Based on these experiences, the new teacher realizes that teaching is not simple and that this primary phase of the teaching career is a period of tension and intense learning. The beginning of the teaching career is a time for adjustments and new experiences are, in most cases, difficult and disconcerting.

The expression "reality shock", used mainly by Veenman (1988), is utilized by several authors to represent the initial difficulties of beginning teachers. This author also highlights the existence of different factors that can contribute to the "reality shock" in new teachers.

The first phase of the teacher's professional cycle, "entry into the career", is characterized by aspects of "survival" and "discovery". "Survival" is identified as:

The 'shock of the real', the realization of the complexity of the professional situation: the constant groping, the concern with the self, the distance between the ideals and the everyday realities of the classroom, the work fragmentation, the difficulty in coping simultaneously the pedagogical relationship and the transfer of knowledge, the oscillation between relationships that are too intimate and too distant, difficulties with students that create problems, with unsuitable teaching material, etc. (HUBERMAN, 1995, p.39).

On the other hand, "discovery" is translated by the initial enthusiasm, the exaltation of being and the situation of responsibility, of having their own classroom, their students, their program and also feeling like a member of a professional teaching staff. In some cases, survival and discovery are experienced alongside, the latter being responsible for enduring the difficulties of the first (HUBERMAN, 1995).

Eddy (1971 apud TARDIF; RAYMOND, 2000) proposes three specific phases that make up the beginning of teaching: the first is a rite of passage from the condition of

student to one of a teacher; newcomers find still in the teacher's lounge that some discussions, such as educational principles, or pedagogical guidelines, are not really important. A second phase corresponds to the initiation into the informal normative system and into the hierarchy of positions filled at school. And the third phase is linked to the discovery of "real" students by teachers. Students do not correspond to the expected or desired image: hardworking, codependent, sensitive to rewards and punishments, eager to learn.

The Huberman (1995) and Silkes (1989) research, in particular, are part of a wide investigation movement that assumes the biographical approach as an epistemological perspective and indicate the importance of studying the teachers' life stories, as they influence in a significant way their professional journey. "Throughout their personal and school life history, it is assumed that the future teacher internalizes a certain number of knowledge, skills, beliefs, values, etc., which frame their personality and their relationships with others [...]" (TARDIF; RAYMOND, 2000, p. 218).

The way each one of us teaches is directly connected to the person we are, which in part, is due to our life experiences and the environmental education where we have been located, over the years, as students. During this period, the beginning teacher tries hard to reach some level of confidence in dealing with the problems of each day and with the established relationships, while they must also acquire professional knowledge (MARCELO GARCIA, 1999).

According to Corrêa and Schnetzler (2017), the process of learning to teach is not limited to initial teacher education, nor to the first years of the profession.

[...] regardless of what we do in undergraduate courses or how we do it, in the best case scenario we can only prepare teachers to start teaching. It is also possible to notice that training students, when they graduate, do not see themselves as prepared to face the dilemmas of the beginning of their careers, which confirms the distance of education offered in teaching degrees from actual teaching practice (p. 42).

For the authors, to be a teacher is to be committed to their practice and to the reflection on it throughout their career.

3.3. Induction/induction programs for beginning teachers.

3.3.1. *Insertion/Induction programs around the world*

Insertion or induction programs have been developed for years in several countries, such as Spain, Italy, Portugal, Greece, Netherlands, United States, New Zealand (MARCELO GARCIA, 2009; MARCELO GARCIA, 1999). A study on the evaluation of induction teaching programs in England, developed by Smethen and Adey (2005), concluded that they reduce the beginning teachers' anxieties.

According to Marcelo Garcia (2009), if in the past, the idea that beginning teachers needed an organized support system for entering into the career was considered as something necessary, now it is understood as a key element in the process of beginners' retention and quality improvement of their teaching.

The insertion programs' conception, definition and philosophy, as well as the performance methods and their effects, differ from program to program and may vary according to the countries in which they are implemented. The main goal, whatever the format of the insertion programs, aims to provide support to beginning teachers, so that the insertion into practice happens more gently and favors the permanence in the career.

Regarding the definition of insertion programs, Zeichner (1979 apud MARCELO GARCIA, 2009) states that it is a structured program that aims to provide systematic and sustained support to beginning teachers, during their first school year, to those who have completed their initial training and received certification to teach. In France, Greece, England, Northern Ireland and Italy, according to Marcelo Garcia (2009), there is another definition for insertion programs, which is understood as a testing year that is required of beginning teachers, before obtaining certification, so that is, after completing their education, but without receiving a diploma, they are presented to the first year of their career, under supervision and counselling, and only receive their certification to teach if they succeed in participating in the insertion program. For these reasons, they receive support and are supervised and evaluated by different people, such as: school principal, mentor, inspector, teachers from initial training institutions (MARCELO GARCIA, 2009).

3.3.2. *Insertion/Induction Programs in Brazil*

In Brazil, there are few insertion programs, as demonstrated by the study by Mira and Romanowski (2015), which was carried out in 2014 based on the scientific paper from the *IV Congresso Internacional de Profesorado Principiante e Inducción a la Docencia*. For this, based on the papers published in the annals of the event (see Table 2), six articles were taken as the focus of analysis, that refer to the development and evaluation of professional insertion programs for beginning teachers and the effects of these programs on teaching practice.

Table 2. with identification of papers on Brazilian insertion programs analyzed by Mira; Romanowski (2015)

Paper	Author	Institution
1	PENA, G. B. O; SILVA-Neta, M. E. B.; JESUS, L. P.; FERREIRA, P. R. S.; VÉRAS, N. S.	UFMT – Campus do Araguaia/MT
2	ROMANOWSKI, J. P.; SOCZEK, D.	PUCPR; UNINTER
3	MELIN, A. P. G.; NOGUEIRA, E. G. D.	UFMS
4	MIRA, M. M.; CARTAXO, S. R.M.; ROMANOWSKI, J. P. MARTINS, P. L. O.	PUCRS; UNINTER; SME-Curitiba
5	MASSETO, D.C.; REALI, A. M. de M. R.	UFSCar
6	MANFIOLETI, R. M.; ROSA, S. N.; BLASIUS, J.; CARDOSO, V. D.; MEDEIROS, C. R.	UNESC

Source: MIRA; ROMANOWSKI (2015, p. 89-90).

In Brazil, teaching initiation policies were recently implemented and have the purpose, according to André (2016), “[...] to offer quality professional training to future teachers, in order to obtain better results in basic education children and young people’s learning” (p.49). Some examples of these teaching initiation policie can be mentioned, such as the PIBID (Institutional Program for Teaching Initiation Scholarship), launched in December 2007, and the Pedagogical Residency program, in October 2017.

About these two programs, it is emphasized that both have contributed to improving education in the country and encouraging the teaching career. However, despite the fact that they assist a substantial portion of undergraduates, some authors, such as Mira and Romanowski (2015, p. 89), do not consider them as professional insertion programs for beginning teachers, as their target group is students from licentiate degrees, that is, future teachers who have not yet entered the school system.

4. Research on Chemistry teaching initiation in Brazil

Xavier (2014) conducted a survey in the Digital Bank of Theses and Dissertations and, from the papers found by the author, which refer to the career beginning, identified that the first paper published in Brazil about teachers beginning their careers in Chemistry is Pena's (2010) dissertation. Until the date researched by the author, March 2013, only two dissertations were identified in the Chemistry area, but one of them was related to teaching initiation at PIBID; therefore, the dissertation by Pena (2010) was considered to update the data in this article, until June 2021 (Table 3).

Table 3. Theses and dissertations published in BDTD and Academic Google until June 2021.

Kind	Title	Author/Year	Institution
Dissertation	The beginning of teaching: experiences, knowledge and conflicts of three Chemistry teachers.	Pena (2010)	UFU
Thesis	The process of socialization and professional identity construction of the beginner Chemistry teacher.	Furlan (2011)	PUC/SP
Dissertation	The early years of teaching Chemistry: from the university to the school floor.	Corrêa (2013)	UNIMEP
Dissertation	Normalizing voices present in the process of professional identification of high school Chemistry teachers at the beginning of their careers.	Janerine (2013)	UFSJ
Dissertation	The initial training of Chemistry teachers and the practice of teaching at school: which discourses are at stake?	Christino (2013)	UFPEL

Source: Authors

In the research carried out by Pena (2010) about Chemistry teachers at the beginning of their career, she identified that the difficulties and experiences that permeate this phase of teaching are not very different from the process of initiation of teaching from other subjects' teachers. However, some particularities were noted in the beginning of Chemistry teachers' careers, such as: lack of mastery of Chemistry subjects, difficulties related to abstract models teaching, lack of understanding about the use and way of utilizing teaching resources, especially those connected to educational technologies and experimentation, lack of understanding of students' learning processes and also about the importance of teaching certain Chemistry knowledge, difficulties of epistemological nature, difficulties in selecting the content that should be taught and difficulties in transforming content into didactically teachable means (Pedagogical Content Knowledge) (PENA, 2010).

According to Montalvão and Mizukami (2002), the lack of mastery of specific knowledge compromises the knowledge of how to teach. Furthermore, the absence of this teaching knowledge influences the way teachers organize and develop their curriculum, as it is through content and pedagogical methods knowledge that their adaptation to a Pedagogical Content Knowledge becomes possible. According to Pena (2010), this know-how, Pedagogical Content Knowledge (CPC), described by Lee Shulman, depends on content knowledge; it is the teacher's specific knowledge that makes them capable of transforming and adapting forms of teaching the concepts, according to their audience (student). Carvalho (2001), states that: “[...] countless papers on teacher education have persistently shown the significance of a deficiency in mastering conceptual knowledge of the subject to be taught, which transforms the teacher into a mechanical transmitter of textbook content ” (p. 115).

From the research selected in this article, the only thesis was Furlan's (2011). Based on theoretical references that discuss, on one hand, issues related to school culture and, on the other, aspects of socialization and construction of professional identity, this research sought to unravel how the process of socialization and construction of professional identity of beginning Chemistry teachers takes place, in the face of a new school environment, involving the culture transmission, its rules, hierarchies, values, rituals and strengths, by other school agents. With the participation of 14 Chemistry beginning teachers, working in public/state and private schools, the results of this inquiry allowed to state that the socialization processes of teachers involve individual and collective aspects, both steady and temporary that result in the identities of Chemistry beginners teachers, which are characterized by the duality of relation and biographical processes in the face of school culture.

In the research by Corrêa (2013), it was sought to display the main difficulties experienced by beginning Chemistry teachers, how they have been trying to overcome them, in addition to questioning the possible impacts of the first teacher contact with the reality of classrooms. Based on interviews with five Chemistry teachers, with less than three years of teaching experience, the research is structured in three analysis axes: i) beginners' dilemmas: they refer to the difficulties faced at the beginning of their career and the attempts to overcome them; ii) the Chemistry teachers' training: gaps and challenges, directing the discussion to the training teachers' needs - especially those related to the duality between theory and practice - seeking, through literature, to point out paths to be followed to overcome them; and iii) the school role in modern times: teacher, students and knowledge, thinking about the role of the School in society, its working conditions and the

student's relationship with knowledge. The need to discuss students' lack of interest and their detachment from studies.

In an attempt to understand the processes of the constitution of professional teaching identities, Janerine's (2013) investigation brings the voices (polyphony) present in five high school chemistry teachers' statements, at the beginning of their careers. Based on interviews, the author, through the theoretical assumptions of Mikhail Bakhtin's "Theory of Enunciation", relies on discourse analysis to seek to understand the discussion of the beginning teachers' statements. For Janerine (2013), professional identities result from an articulation from teachers to the flow of normalizing voices with which they established relationships i) throughout their school experiences prior to graduation, ii) during initial training and iii) in work situations and from the expectations found at school.

Finally, the research carried out by Christino (2013) is brought to the context of this article. In it, the author applies a methodology that meets the assumptions of discourse analysis, according to Michel Foucault's theory, which considers discourse as a practice that produces the objects about which it refers to. The research subjects were graduating students in the period 2011/2, Chemistry teachers entering the school Colégio Municipal Pelotense and interns from 2011/2 to 2012/1, all students or graduates of the Chemistry Licentiate Degree at UFPel. According to the author, the research showed the recurrence of a statement that permeated different discourses, at university and at school, that being a Basic Education teacher is something lesser, and it is possible to see throughout the study, its effects on the constitution of the teacher's professional identity. From the results of the analysis, it is clear that there is an odness feeling on part of the school in relation to the individuals who start teaching, either as an intern or as an incoming teacher.

5. Final Thoughts

Even after having completed a well-qualified degree course, teachers at the beginning of their careers tend to face different types of tensions and challenges resulting from the very nature and the "object" of teaching practice: people. Working with/about humans and the student-teacher-knowledge interactivity makes teaching a complex action that also requires permanent reflection on the practice itself, their social and educational reality, being consequently, a process practice (PINHEIRO; LEITE, 2011, p. 2)

Contrary to the career stages indicated by Huberman (1995), we believe that they do not necessarily need to end with a chronic regret condition. Although this process is dynamic and influenced by multiple elements, professional teacher development cannot be

assumed as a linear and hermetic process. In the same way that the initiation is full of excitement, the professional experience, over several years, can also unveil a lot of delight, passion and moments of (re)finding, which makes teaching a learn-teach-learn practice, as well as an inspiring [collective] challenge.

Dare to say that, the initial teacher education courses will never be complete to the point of guaranteeing the “unsecurable”: forming ideal teachers ready to deal [meticulously] with any problem-situation in the school context. However, we are responsible, as trainers, for providing assistance - theoretical and practical - that support the reflection-action of teachers at the beginning of their careers. It is this theoretical confidence, based on quality and critical reflection, that allows the newly graduated to assume that theory and practice are inseparable. Likewise, recognizing, as Barbosa (2014, p. 20) claims, that “[...] theory alone does not offer answers to the problems faced in the teaching practice; on the contrary, it needs practice as a parameter and purpose”. For said author, practice offers challenges that justify the need for future teachers, or already teachers, to mobilize theory to building answers. So, in this process, theory is a resource and not a form of oracle.

Lastly, we enhance the importance of teaching courses bringing into the formative discussion the early years in teaching subject and the notes that educational research show about this period. Recognizing research in education as a *reflection-action* helping construct is a requirement for teaching practice in the school's *space-time*.

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