

A genealogy of teaching through the beginning of initial formation of Chemistry teachers in Brazil

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ABSTRACT. It is sought, through a genealogical perspective (Foucault, 2015), to present the window game that configures the establishment of Specific/Special Didactics of Chemistry in the courses of formation of Chemistry teachers in Brazil. The analytics proposed here follows the historical line of the conformation of a notion of Didactics from the perspective outlined by Comenius (2006), going through the production of archives that materialize its development in the national scenario, until the displacement of General Didactics, originated from Pedagogy, for Specific/Special Didactics, located in the other degrees. The intertwining of these forces follows the bias of the emergence of Specific/Special Didactics of Chemistry in the Brazilian scenario, with the inheritance and promise-slogan that the mastery of didactic techniques would guarantee the formation of a teacher capable of teaching everything to everyone.

Keywords: teacher training; chemistry teaching; didactics.

Uma genealogia da didática pelo viés da formação inicial de professores de Química no Brasil

RESUMO. Busca-se, por meio de uma perspectiva genealógica (Foucault, 2015), apresentar o jogo de forças que configura a instauração da Didática Específica/Especial da Química nos cursos de formação de professores de Química no Brasil. A analítica aqui proposta segue a linha histórica da conformação de uma noção de Didática a partir da perspectiva delineada por Comenius (2006), perpassando pela produção de arquivos que materializam seu desenvolvimento no cenário nacional, até o deslocamento da Didática Geral, oriunda da Pedagogia, para Didática Específica/Especial, situada nas demais licenciaturas. O entrelaçamento dessas forças segue o viés da emergência da Didática Específica/Especial da Química no cenário brasileiro, com a herança e promessa-slogan de que o domínio de técnicas didáticas garantiria a formação de um professor capaz de ensinar tudo a todos.

Palavras-chave: formação docente; ensino de química; didática.

Una genealogía de lo didáctico a través de la formación inicial de profesores de Química en Brasil

RESUMEN. Se busca, a través de una perspectiva genealógica (Foucault, 2015), presentar el juego de ventanas que configura el establecimiento de Didácticas Específicas/Especiales de la Química en los cursos de formación de profesores de Química en Brasil. La analítica propuesta aquí sigue la línea histórica de la conformación de una noción de Didáctica desde la perspectiva esbozada por Comenius (2006), pasando por la producción de archivos que materializan su desarrollo en el escenario nacional, hasta el desplazamiento de la Didáctica General, originada a partir de Pedagogía, para Didáctica Específica/Especial, ubicada en las demás titulaciones. El entrelazamiento de estas fuerzas sigue el sesgo del surgimiento de la Didáctica Específica/Especial de la Química en el escenario brasileño, con la herencia y promesa-lema de que el dominio de las técnicas didácticas garantizaría la formación de un docente capaz de enseñar todo a todos.

Palabras clave: formación de profesores; enseñanza de la química; cosas didácticas.

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Introduction

The historical production of truths proper to a *modus operandi* in the field of teacher education is co-extensive to a series of relations of forces whose energy is released from the life we live in our fields of action. In Brazil, for instance, the initial formation of teachers was strongly marked by the investment and presence of the discipline of General Didactics in the formation courses.

Over the years, and the mobilization of individual and collective forces combined, there was a passage from the use of General Didactics to Specific/Special Didactics in the field of initial teacher education. Taking this passage into account, the present study is interested in asking about the conditions of possibility that contingent this passage, focusing, mainly, on the field of initial training of Chemistry teachers. The initial formation of Chemistry teachers is, in the present study, the bias through which the emergence of Specific/Special Didactics from General Didactics is analyzed. This movement is common to teacher training in all specific areas known in educational jargon as the "teaching of", that is, teacher training for the teaching of Physics, Geography, Mathematics, Visual Arts, Music, etc.

Based on this intention, we develop a genealogy (Foucault, 2015) of this passage, combined with a search carried out in documentary collections, where we ask about the play of forces that gave it a necessity, coherence and action, to present the provenances that were around this movement in Brazil. About the genealogy it is important to ponder that:

History, genealogically directed, does not aim to rediscover the roots of our identity, but on the contrary, to strive to dissipate it; it does not intend to demarcate the single territory from which we came, that first homeland to which metaphysicians promise that we will return; it intends to make all the discontinuities that run through us appear (Foucault, 2015, p. 82-83).

A genealogy builds a movement in the search for understanding the conditions of possibility, in the domains of power and knowledge, of discontinuities, cracks that produced the surface of emergence of specific statements and practices. These conditions contribute to the structuring of discursive fields and the logics that produce subjectivities, including when it comes to the production of a notion of school and the initial training of their respective teachers, in this case teachers of chemistry.

Thus, based on the attention to the forces that were in flux for the consolidation of specific ways to think about Didactics through the initial training of Chemistry teachers in Brazil, this genealogy is outlined, groping unsuspected and often apparently disconnected points, which allow the development of a historicity of this passage in Brazil.

A genealogical approach: Didactics in the Teaching of Chemistry

The initial training courses for Chemistry teachers in Brazil, as well as other courses, were based, since their creation, on the understanding of Didactics proposed by Jan Amos Comenius (2006).

Comenius' (2006) notion of Didactics is linked to his work *Didáctica Magna: treaty on the universal art of teaching everything to everyone*, published in 1657. This work is considered to be the 'founder' of modern pedagogy, contributing for Comenius (2006) to be taken as the main reference in the context of initial teacher education courses in Brazil.

Comenius (2006) sees Didactics as the art of teaching everything to everyone. The concept of Didactics that drives his writings and inspired/inspires a good part of the training courses, until the contemporary times, is the following:

We dare to promise a Didactic Magna, that is, a universal art of teaching everything to everyone: to teach in the right way, in order to obtain results; to teach efficiently, therefore without teachers and students becoming bored or bored, but on the contrary, having great joy; to teach; to teach strongly, not superficially, in any way, but to lead to true culture, to good morals, to a deeper piety. Finally, we demonstrate these things a priori, starting from the immutable nature of things themselves, as if we would make perennial streams spring up from a living fountain, which would then unite into a single river to constitute a universal art, to find universal schools (Comenius, 2006, p. 13).

Attentive to this conception of Comenius' Didactics (2006), it is inevitable to refer the thought to the context where this text was produced, closely related to the Christian religiosity and also to the notion of morality and virtue that surrounded his religious precepts. This Didactic thought by Comenius was mobilized in the mid 1600s, the height of the bourgeoisie's manufacturing production.

Cordeiro (2007) presents some themes and problems related to Didactics, contemplating some important points to tense Didactics in Comenius (2006). For Cordeiro (2007, p. 166), the Didactic Magna of Comenius is related to the collective undertaking of the so-called "[...] European intellectuals of the 13th century to build a scientific and rational explanation of the world, in which figures such as Galileo, Descartes and Bacon were involved. This Didactic would teach everything and everyone, [...] by adopting a single and universal method that would shorten the teacher's work and make knowledge more accessible to students" (Cordeiro, 2007, p. 166).

It was strongly marked by Methods, which compose, in an incisive way, the subsequent chapters of his work *Didacticus Magna*. For Comenius, we can think of the following notion of method:

Let the bow and stern of our didactics be: to seek and find a method so that teachers teach less and students learn more; that in schools there be less talk, less boredom and useless work, more free time, more joy and more profit; that in the Christian republic there be less darkness, less confusion, less dissension, more light, more order, more peace and tranquility (Comenius, 2006, p. 12).

Based on this perspective of thinking the method in Comenius (2006), it becomes possible to link the origin of this discourse of Didactics to the sophistic¹ of the Renaissance period (since the 17th century), which is crossed by the teaching of doctrine through exercises of spiritual nature captured by practices of Christian character.

Comenius dealt with the emergence of this notion of Didactic Magna in the following way:

This art of teaching and learning, to the degree of perfection to which it now seems to be aspiring, was largely unknown in former centuries: for this reason, in the world of letters and schools there was always accumulated weariness and weariness, uncertainties and failures, errors and imperfections, which is why only those endowed with superior ingenuity could venture in search of a more solid instruction (Comenius, 2006, p. 15-16).

In this tone, one can infer that Didactics passes through the promise of making an individual a teacher, a subject capable of teaching everything to everyone, as an art of teaching with a degree of divine perfection, as a practice that leads to student learning from point A to, inevitably, point B.

This promise of Didactics is linked as a means by which one becomes a teacher, as a way to technically and rationally organize pedagogical practice, as the chance to "[...] result in more successful learning" (Cordeiro, 2007, p. 21) and, at the same time, to establish "[...] with precision the rules of that method" (Cordeiro, 2007, p. 22).

According to Gonçalves, in his volume I of the book *General Didactics* (1982), used in Brazil as a reference in initial education courses mainly in the 1980s and 1990s, Didactics is characterized: "a) As to the object: it is a pedagogical discipline, eminently practical and normative, which has as its specific object the technique of teaching². b) As to the content: it is a systematized set of principles, norms and specific techniques to direct learning" (Gonçalves, 1982, p. 48).

In this view, Didactics appears as responsible for the educational technique, having as its object teaching and its respective learning³ (Gonçalves, 1982). It is this promise of General Didactics that gives coherence to the distinction between undergraduate and graduate courses. This distinction is fed by what Dallabrida (2001, p. 26) calls "[...] a set of devices that includes the menu, the teaching programs, the manuals and compendia, and the diverse didactic materials of the knowledge-disciplines". Moreover, this same Didactics emerges based on the conception that man, to be man, needs to be formed. In the words of Comenius (2006, p. 72), for man to learn "[...] it will be necessary to teach him, little by little to sit, to stand upright, to walk, to move his hands to operate [...]", while these same prerogatives for man to learn extend to everyone "[...] education is necessary for all" (Comenius, 2006, p. 75), which takes prominence as the dissemination of norms of behavioral conduct for all (the way to sit, the way to 'pay attention' stand out as important mobilization for man, supposedly, to learn).

This same education is linked to what Comenius calls the exercise of command:

Those who one day will command others, as kings, princes, magistrates, pastors, and Doctors of the Church, need to be educated in wisdom more than anyone else, just as guides need to have their eyes trained, and interpreters their

¹ The Sophists were intellectuals who worked in the field of rhetoric and lived in the Va. They valued intellectual life, rhetoric, 'the art of good speech'.

² Teaching, which, in the work, appears from three concepts: "1 - Etymological concept (from the Latin in signare): 'to teach is to put inside, to engrave in the spirit'. Teaching, then, is to record ideas in the student's head. The method used: 'mark and take the lesson'; 2 - Ancient concept: 'to teach is to transmit knowledge'. For Comenius, the teaching process included: 'intellectus, memoria et usus', that is, understanding, memorization and application. Method: expository and explanatory classes. The student memorized what the teacher transmitted verbally; 3 - Modern concept: 'teaching is to technically direct learning', that is, 'to guide the student's activity in a direction that is valuable for life'. Method: 'learn by doing', that is, 'learn to do by doing'" (Gonçalves, 1982, p. 67).

³ Learning that appears in the work from three concepts: "1 - Traditional concept (mechanistic or connectionist), based on Thorndike's psychological theory of learning: 'learning is to relate to a given stimulus S a certain response R (which arises 'by trial and error') until it is fixed by repetition'. 2 - Modern (Gestalt) concept, based on the Gestalt psychological theory of learning: 'learning is to understand a global situation to react appropriately to it'. One learns by insight (discernment, penetration, intravision). 3 - Modern concept in function of the end or result: 'learning is the modification, for the better, of behavior, in its triple aspect: thinking, feeling and acting to promote adequate and efficient adjustment of the learner to the physical and social environment'. Students learn when they reflect, reason, applying knowledge" (Gonçalves, 1982, p. 67-68).

tongues, and the horn needs to be able to play, and the sword to cut. In the same way, subjects need to be enlightened, so that they can prudently obey those who command with wisdom: not with obligation and with servile obeisance, but willingly and for the love of order. This is because a rational creature must be guided by reason, and not by means of shouting, imprisonment, or beatings. And those who act differently offend God, who has also put his image in them, and human affairs will be filled - as they are - with violence and discontent (Comenius, 2006, p. 76).

The notion of command exercise proposed by Comenius (2006) presents a use of people for a purpose he considers greater, in this case the church and an embryonic state centralization as the leading threads of the art, which is supposed to give viability, which tries to teach everything to everyone.

To Comenius we address two seemingly naive questions. The first question, 'what is everything?', stresses that "A roll of universal knowledge of scientific character, coming from the colonizing and mercantilist culture centers of the West, make up what is called 'everything'" (Corrêa, 2000, p. 78, our emphasis). After all, what is everything for a religious pastor living in central Europe between 1592 and 1670?

The second addressed to Comenius, is: 'who is everyone? Intended to leave it hovering in the text, such a question points out "[...] the contingents of individuals colonizable and possible to be reduced or made normal, enclose what is said to be everyone" (Corrêa, 2000, p. 78). There:

Besides 'everything' and 'everyone,' [there remains] an unnamed set of knowledge and ways of living that does not occupy space in historical time or geography, to which we have access through school programs and their extensions in the mass media (Corrêa, 2000, p. 78, our emphasis).

What Corrêa (2000) stresses with this movement is directly linked to the concern of what escapes the notion of 'everything and everyone', announced by Comenius (2006) in the seventeenth century. With this, we can also question: and what escapes from this everything? Does what escapes disappear? Is it nonexistent?

This question takes shape since everything that is developed in other time-spaces that deviate from this notion does not seem to fit in with this way of thinking about education. There is, then, the emphasis that everything passes through a moral sieve and, at the same time, through a sieve that puts its existence in check, as was the effort undertaken by the Jesuits when they asked themselves 'Are the Indians anyone'⁴?

"It is within the limits of this selection of knowledge, or about it, that everything that is said, in the instance of laws or pedagogy, acquires coherence, in such a way that schooling seems to enclose in itself the possibilities of education" (Corrêa, 2000, p. 78). Production of a narrative that gives coherence to the way the distribution and selection of knowledge operates and happens in the school space, which, in a way, conditions the *modus operandi* of the training field of its respective teachers.

As a contingency to think about the field of Didactics, the book *Didactics of Higher Education*, by Antonio Carlos Gil (2007), is an important instrument because it points out that Didactics was initially related to the field of Philosophy, and, in turn, "From the end of the 19th century, Didactics started to seek foundations also in the sciences, especially in Biology and Psychology, thanks to experimental research" (Gil, 2007, p. 2). About this contingency, we can consider that

In the early 20th century, in turn, numerous school reform movements emerged both in Europe and in America. Although diverse among themselves, these movements recognized the insufficiency of traditional didactics and aspired to an education that took more account of the psychological aspects involved in the teaching process. These pedagogical trends were often brought together under the name of 'New School' or 'Active School' Pedagogy. The literature concerning these trends is very extensive and involves works by authors such as: Ovide Decroly (1871-1932) from Belgium, Georg Kershensteiner (1854-1932) from Germany, Roger Cousinet (1881-1973) from France, Édouard Claparède (1873-1940) from Switzerland, and John Dewey (1859-1952) from the United States. These movements emerged within a historical-social context that had as its main focus the industrialization process, with the industrial bourgeoisie establishing itself as an interested and hegemonic class, consequently, in the spread of liberal ideas (Gil, 2007, p. 2-3).

This modification of the Didactic understanding, now seen under the prism of psychological theories, crossed Brazil in the mid-1920s through: Fernando de Azevedo, Anísio Teixeira and Lourenço Filho. At the heart of the New School and the Manifesto of the Pioneers of New Education (1932), with its promise of 'pedagogical renovation', inspired mainly by the writings of John Dewey and Edouard Claparède, a technical transformation was announced, "[...] that sought to apply in educational practice the knowledge derived from the behavioral sciences" (Gil, 2007, p. 3).

In Brazil, during the first years of the 30s, Francisco Campos, Minister of Education, created the Faculty of Philosophy, Sciences and Letters of the University of São Paulo still in 1934. With this, he gave the kick-start

⁴ Question and narrative that justified colonization and catechization, as well as the mystical promotions that were intended to make them children of God.

for Didactics to enter, for the first time, the courses that form teachers, more specifically with Article 20 of the Decree-Law no. 1.190 of 1939. According to Veiga (1988, p. 30), "In the beginning, the pedagogical part of the existing teacher-training courses was held at the Institute of Education" and Didactics "[...] was instituted as a course and discipline, lasting one year" (Veiga, 1988, p. 30).

Years later, the Organic Law of Normal Education, Decree-Law no. 8.530 of 1946, provided for specialization and school administration courses. In the specialization, there were the following branches: "[...] pre-primary education; special didactics of the complementary primary course; special didactics of supplementary education; special didactics of drawing and applied arts; special didactics of music and singing" (Decree-Law No. 8.530, 1946).

In the mid-1950s, the field of technical rationality and the search for efficiency directly affected the Didactic conception in flux in the country. Scientific neutrality and technicism drove that, in the teacher education courses, emphasis was given in the discipline of General Didactics to the production of teaching plans/lesson plans "[...] the formulation of instructional objectives, the selection of contents, the techniques of exposition and conduction of group work and the use of technologies in the service of the efficiency of educational activities" (Gil, 2007, p. 4). As Gil (2007, p. 4) points out, "Didactics came to be seen mainly as a set of strategies to provide the achievement of educational products, being confused with Teaching Methodology".

The Opinion of the National Education Council [CNE] CNE/CP # 009 (2001) stated, years later in its item 2.1.4, that "The contents to be taught in basic education must be treated in an articulated manner with their specific didactics" (Opinion CNE/CP # 009, 2001, p. 39), which allows us to state that Didactics, previously endowed with a General character, now becomes a particularized point of the Specific discipline, also known as Special.

Teachers in training need to know the content defined in the curricula of basic education, for the development of which they will be responsible, the didactics of each content and the research that supports them. It is necessary to treat them in an articulated manner, which means that the study of the contents of basic education that they will teach should be associated with the perspective of its didactics and its foundations (Report CNE/CP nº 009, 2001, p. 39).

The statement of the CNE/CP Parecer nº 009 (2001) emphasizes the production of Didactics specific to the specialized sectors of each discipline in the curriculum (Specific/Special Didactics). This produces a shift from the General Didactics that had been developed so far to a Specific/Special Didactics of the discipline, with an independent object of study.

Didactics, centered first in the productions coming from Pedagogy⁵ and later on specialized for the undergraduate courses, started to emphasize a pedagogical transposition of the contents of the knowledge area in "classroom" spaces, as is the case of the Didactics of Chemistry. This movement towards the specification of Didactics concentrated in the undergraduate courses began to require, especially in public teaching competitions, the need for professionals from the primary area of training, as is the case of Chemistry, to exercise their profession in related courses, taking into account the publication of the Guidelines for the training of teachers of Basic Education, in higher-level courses, in the year 2001 (Parecer CNE/CP nº 009, 2001).

When these professionals started to occupy space in the formative experiences, using regency in the discipline of Specific/Special Didactics, a movement strongly leveraged by international programs and organisms and from the field of experimental Natural Sciences began, entering the horizons hitherto created with the promise of directing the thought in teaching and the Didactic transposition of scientifically established knowledge. This contingency has gradually reduced the relevance and significance of General Didactics in initial teacher education courses since Specific/Special Didactics has come to correspond to each specific science; in other words, it has produced a link between Didactics and the knowledge of a specific area (Bedoya, 2005).

The direction toward the need for a Specific/Special Didactics of the other undergraduate courses ended up producing a lack of strength in the need for the existence of General Didactics that was developed by professionals trained in the area of Pedagogy, anchored on the promise that this same General Didactics would no longer be able to train teachers from the specific field of the other undergraduate courses.

The study prepared by Freitas advocates that this shift from General Didactics to Specific/Special Didactics led to the circumstance that

[...] the pedagogical process came to be studied insofar as it was linked to the teaching of a certain discipline, by the professional who dominated the content of this discipline. It was up to the physicist to study the teaching of physics,

⁵ Pedagogy is defined etymologically by Romanda Gonçalves, in her book *Didática Geral*, volume I (1982), as "[...] the science of directing children" (Gonçalves, 1982, p. 45).

the chemist to study the teaching of chemistry, etc., and it was then concluded that the pedagogue was dispensable. This led to the idea that pedagogy is everybody's domain. The teaching of physics, for example, can only be studied and taught by physicists, but the specific disciplines of pedagogy, for example general didactics, can be taught by anyone who is interested. This 'allotment' established a great divide in the field [...]. The differences between the teaching of this and that discipline were emphasized (Freitas, 1985, p. 15, emphasis added).

Freitas (1985) also reinforces that, from this movement, there was a contradiction with the paths already established by science itself, in the sense that "Science does not evolve by emphasis or search for differences. Rather, it evolves seeking regularity, uniformity" (Freitas, 1985, p. 15), which, from a unilateral view, "[...] pedagogical practice was divided among countless professionals working in isolation in their disciplines" (Freitas, 1985, p. 15).

The notion of pedagogical work reinforced the duality between teaching and learning with the same logic of theory and practice, theory being abstract and practice empirical (Freitas, 1985), while much of the pedagogical theories that emerged from this were imported from psychological theories, becoming the 'backyard' of psychology, especially behavioral psychology (Freitas, 1985, p. 16), cultivating the promise that each person's behavior would account for externalizing whether or not they were learning.

An example of this is the ascendancy of general theories of group dynamics, report completion, among others in the Didactics subjects in teacher training. When it comes to group dynamics, these were justified as a means for man to actually appear. A group as a means to logicize love and amortize logic, as an integration of conduct. It is in Jean Piaget that a good part of the dynamics materialized, appearing, in this case, as a didactic effort.

By directing attention to the materials used by professors who trained Chemistry teachers in the 1980's and 1990's in Brazil, found by means of a search made in a collection donated to one of the teachers linked to the Laboratories of Teaching Methodology of the Department of Teaching Methodology of a Brazilian Public University, it was possible to have access to a range of information that materialized the work of Group Dynamics.

Group Dynamics training is taken as a didactic effort to lead individuals to operative thinking, as well as a situation that provides ample human relationships. In the group, thinking appears as forced to become operative and conduct to become cooperative. Here, operativity would allow the group to exist and the group would promote its operativity. In this tone, then, there would be a logic of love as desirable as the logic of thought and the logic of conduct. This Group Dynamics training would force the individual to at least understand the point of view contrary to his own, leading to mental operation.

This movement would aim at the internalization of the group, after logicization and cooperation, since this strategy would approach a fundamental impasse of the human being, which appears as an amorized intelligence. In short, this training would put the natural man (intuitive, egocentric, etc.) to act operatorily, by means of a regulation, a group psychotherapy that would balance intelligence and affectivity. Therefore, the pedagogy of Group Dynamics would allow the conflict between individualization of the learner to be reconciled, since the individual would only appear in his dimension within the group. Thus, individual study techniques would be compatible with socialization techniques (individual would learn from the group, group would learn from the individual). Thus, didactic techniques would alternate between individual work aimed at group work, and group work aimed at what I would call individual motivation. Everything would pass in a kind of soccer team training in which individual physical preparation does not dispense with training together.

About the teacher's work in Group Dynamics, the teacher appears as someone who needs to avoid that the individual process becomes vindictive and, at the same time, that the group cohesion becomes leveled down. This would be constantly reviewed by the group analysis, where the resulting individual progress would put the group in a permanent state of rebalancing, under the penalty of breaking group cohesion. With this perspective, the pressure of the group in progression would put each element in a state of tension to maintain itself at what they called the group level.

Group Dynamics would be an effective means for individual expression, a middle way between mass and individual. A demassification resource in which the individual can behave individually.

It is worth remembering that one of the strengths of General Didactics corroborated the focus on teaching techniques as a basic resource for teacher training. The mastery of teaching techniques would be the basic requirement for the performance of the education professional in any area of concentration. Hence the justification for General Didactics is applies to any discipline. Along with the emphasis on teaching techniques, a series of equipment, materials and technical devices emerged as aids to the teacher's work. From the popularization of cardboard sheets, through mimeographs, overhead projectors, slide projectors, to the

contemporary predominance of information and communication technologies embodied in digital teaching resources, the disciplines in the didactic spectrum run the risk of becoming promoters of the sale of equipment, materials and resources, as well as the alienation of the quality of educational work to the availability, or not, of these resources.

Given these contingencies that crossed the field of education in Brazil, with the emergence of Law n. 5.692 of 1971, conditions were created for the need to compulsorily train teachers in the Specific/Special areas of scientific knowledge, to exercise classroom strategies in schools. Under the aegis of the developmental and behavioral strategies, conducted by the educational policy of the military, this ends up opening space to demand a Didactic training characteristic of the determined school knowledge.

In this way, the General Didactics coming from Pedagogy loses strength and space in favor of a Didactics linked to the specific training areas of the other degrees. When dealing specifically with the school question, the notion of didactic transposition emerges with force, promoting the intelligibility of the proper contents of a certain science (Physics, Chemistry, Biology, among others).

There, the contents of the scientific language of science appear conveyed as school knowledge for learning purposes, due to: "[...] the conditions offered by the bureaucratic, scientific and technological apparatus that these [military] could organize, the educational ideals of Francisco Campos, aimed at strengthening the government by the obedience of the masses" (Corrêa, 2005, p. 181).

According to Corrêa (2005, p. 181), from the 1970s on, school evaluation came to mean "[...] application of techniques, of scientific formulas, to obtain the values of each one's performance [...]", which would place the teacher's pedagogical action as "[...] action [...] completely neutral and impersonal [...]" (Corrêa, 2005, p. 181), through the development of assessment instruments, reduced to what the author calls 'sum of scores'. An objective measurement of learning reached not only the schools but also the vestibular exams and the teaching public competitions, which ended up having the purpose of connecting a "[...] subject to a totality. [...] one can say that it is proper of truth games to make it seem, to leave no doubt, that everything and everyone is implicated" (Corrêa, 2005, p. 182).

After the years that made the evaluation and school control mechanisms operational once and for all, the emergence of Law 9.394 of 1996, and the expressive force of interference of international agencies in Brazilian soil, we can point out that, with the Guidelines for Basic Education teacher training (Parecer CNE/CP nº 009, 2001), an important look at Didactic issues is also materialized,

No teacher can create, plan, carry out, manage and evaluate effective teaching situations for learning and student development if they do not understand, with reasonable depth and the necessary adequacy to the school situation, the content of the areas of knowledge that will be the object of their teaching activity, the contexts in which they fall and the cross-curricular themes of the school curriculum. However, it is not always clear which are the contents that the trainee teacher should learn, as he needs to know more about what he is going to teach, and which are the contents that will be the object of his teaching activity. Thus, the distinction and the necessary relationship between knowledge of the object of teaching, on the one hand, and its school expression, on the other, also called didactic transposition, are often disregarded. Without the mediation of didactic transposition, the learning and application of teaching strategies and procedures become abstract, dissociating theory from practice. This learning is essential so that, in the future, the teacher will be able to both select contents and choose the most appropriate strategies for student learning, considering their diversity and the different age groups (Parecer CNE/CP nº 009, 2001, p. 20-21).

Under this aspect and also under the increasing emphasis on the Didactic issue directed to the Specific/Specific areas of knowledge (Didactics of Chemistry, Didactics of Physics, Didactics of Biology, for example), the emergence of Science Teaching in the Brazilian educational context and the training of teachers was concomitantly framed.

In this way, the promise went beyond and took over the scene of the possibility of performing the art of teaching everything to everyone. This has become a slogan applicable to any educational situation, regardless of its success or not as a strategy on the school and classroom floor. More than a set of methods that would guarantee the universalization and the accomplishment of its school goals, the Specific/Special Didactics had/have as a driver the promise-slogan generating the belief that attending classes of a set of coherently connected subjects, according to a logic that goes from simple to complex, from concrete to abstract, would guarantee the production of an educational agent capable of constituting individuals subjected to its educational strategies by promoting, with lightness and pleasure, learning.

Here appears a bifurcation between a coherent body of knowledge transmitted by the pedagogical act: what is said, and the concrete, living, moving, and unbearable body of what is not said. What is said operates

dissociated from what is lived, from what happens. The recommendations, the theories, mental ideas, what 'should be done'. The unspoken are the guarantees of schooling that give coherence to the said. Guarantees:

[...] are the most active elements of the school as a device. These guarantees involve a whole complex of control over time, over knowledge and over bodies that are exercised through teaching programs, content selections, laws, schedules, evaluations, etc. that make discipline, disciplining, penetrate throughout society (Corrêa, 2000, p. 75).

Inventing proper spaces for education; Controlling the time in which activities are developed; Selecting knowledge and giving them universality character; Inventing a knowledge-capacity relationship; Disqualifying other practices in education; Obliging attendance; Serializing; Evaluating; Certifying, are guarantees "[...] that any work in school education must respect" (Corrêa, 2000, p. 82). Operations on the unsaid to make the said have coherence.

In this way, the undertaking of this analytic is connected to what Foucault (2001, p. 1099) calls "[...] simultaneous shaking [...]", between the discursive and the non-discursive. Under this prism, the field of production of a General Didactics and Specific/Special Didactics elaboration takes prominence as the said of the educational process and also in the initial formation of Chemistry teachers. However, the educational process is not only made of what is said, there is the corporal dimension of learning that is inhibited by the school environment itself and its indispensable guarantees, which include the definition of pre-established schedules for the permanence of children and juvenile bodies in the architecturally planned spaces of the classroom, entrance times, exit times, snack/break times, time for evaluations, among others.

Learning to become a teacher, beyond right and wrong, good and bad, is heavily contingent in Brazil by the reliance on the promise-slogan produced by the presence of General and/or Specific/Special Didactics in initial teacher education. Meanwhile, many other disciplinary components of the exact area (General Chemistry, Organic Chemistry, Analytical Chemistry, among others) are in the scope of the initial formation of chemistry teachers and, little, or almost nothing dialogue with the disciplines of a pedagogical nature that, as well as Specific/Special Didactics, corroborate the gears that generate and feed the belief of teacher formation. A mismatch that, to a certain extent, corroborates the *modus operandi* of the teacher training courses in Chemistry, as well as other components of the Sciences in the national scenario.

Final considerations

The present article allowed us to present the genealogical panorama of the forces that contributed to the passage of the notion of General Didactics to Specific/Special Didactics through the initial formation of Chemistry teachers in Brazil. Going through Comenius (2006), bibliographies used in teacher education in Brazil (Gonçalves, 1982), up to tensions and problematizations about this field (Gil, 2007; Corrêa, 2000, 2005, 2006; Cordeiro, 2007; Dallabrida, 2001), it is possible to plot relations of forces that contingent this movement in Brazil.

In general, it is relevant that Didactics, in a broad sense, has emphasized its functioning as a full discursive machine, to the detriment of its potentials to problematize the teaching-learning relation, going beyond it.

Whether in General Didactics or Specific/Special Didactics in initial teacher training courses, the said and the unsaid are always present. It is not a matter of simply alternating between said and unsaid, of shaking or thinking sometimes they said, sometimes the unsaid. So what is it all about? Subjects on the Didactics spectrum in initial teacher education courses constitute the confluence between the specific knowledge of a subject area and the creation of educational strategies capable of promoting students' understanding and use of the concepts of that same area.

When trying to promote the understanding and use of the concepts of a discipline, the general tendency is to remain within the limits of teaching-learning and its direct relationship with the guarantees of schooling: it is not possible to go beyond the scope of the said.

For example, it is common in the mechanics of the teaching-learning practices to promote the teaching of a certain content/concept to obtain sufficiency in an evaluation through a test/exam. This is the most common way of dissociating the concept from its reality, from its active powers, from its capacity to modify our actions by transforming what happens. Our power to change, to transform what happens, is thus deprived of the conceptual tool that was the object of this or that teaching situation. Another way to dissociate a concept from its active potentials can be appreciated in the increasingly common emphasis on circumscribing pedagogical work to the ability to manage information and communication technologies. There is a risk of overlooking the power of thought movement and the expansion of the repertoire of strategies for mobilizing concepts, in favor of the teacher's possession of technical skills in the presentation of school content.

The work within a subject such as Specific/Special Didactics in teacher education courses has the opportunity to experience a dynamic that promotes thinking, instead of a mechanical stimulus to "study" to obtain points and approval in knowledge tests, embodied in the theory-practice duality.

Specific/Special Didactics can be that happy and attentive meeting point between the enlargement of the repertoire of educational strategies, through the promotion of thinking, of the taste for the experience of thinking living questions, of feeling oneself expanding the limits of what has already been thought, in favor of a metamorphic thinking, of a thinking to come.

Instead of a behaviorist stimulation, through competition for scores, the disciplines of the didactic spectrum have the power to emphasize the movements of thought and to promote unprecedented actions in education. One must consider the non-discursive powers of educational work, so that Specific/Special Didactics go beyond the logic of teaching, through a collection of teaching techniques, 'a part' of everything to everyone.

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