

Overview of research on the teaching identity of science, biology, physics and chemistry teachers¹

ABSTRACT

This paper aims to present an overview of national research on the teaching identity of teachers of the Science area from dissertations and theses. In order to achieve this goal, information from three data sources was cross-referenced: a search at the Capes Thesis and Dissertations Bank establishing a ten-year time frame (2008-2018), a systematic review article on Teacher Knowledge (2005 -2012) and, at last, a literature review article on Teacher Identity published at the end of 2019. The crossing of data allowed to identify and locate a total of 23 works that met the criteria of interest in the research. In order to outline the intended overview, the productions found were characterized in relation to the area of training of the research subjects, the context of the researchers' performance, the objectives of the works, the concept of identity adopted, and the types of identities found. The results showed that most studies were carried out with Biology/Science and Chemistry teachers; in addition, that the thematic focus of the teaching identity prioritized in the works was initial training and professional performance; and that most of the production was carried out in the context of initial training. Regarding the concepts of teacher identity that emerged in the research, it was possible to verify a diversity of authors reflecting on the identity processes, mainly those who discuss the concept of identity in the social and social psychology perspectives, as well as authors who conceptualize, more specifically, professional identity. The results indicated that the identity that most emerged from the studies was the professional identity, which is linked to the activity of teaching and which encompasses a set of competences and skills needed by teachers for their professional performance. Some gaps in the studies were found, such as: only one study with Physics teachers, few studies relating the identity processes and curricular reforms, no study on the implications of the use of educational technologies on the teaching identity, and the evaluation of the professional identity related to values and feelings.

KEYWORDS: Teaching identity. Teacher training. Biology. Physics. Chemistry.

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INTRODUCTION

Society has undergone some changes that are directly reflected in the school and in the work of teachers since there is an increasing demand on the level of education of its citizens and on the capacity for innovation and entrepreneurship that they must have. This requirement, in turn, affects teachers and their respective identities as professionals.

To keep up with these transformations in the world, the teacher must have a set of knowledge, skills, competences, attitudes and values that determine the quality of his or her teaching practice.

Based on this assumption, it is understood that the teaching identity is a process of (re) construction and reflects the context and historical moments, and it is up to the teacher to try, in some way, to respond to the new demands placed by society. It is important to mention that each and every profession establishes the (re) construction of an identity and this, in turn, is not acquired, it is not a property, much less a product; the identity is built in the midst of conflicts, and consists of the way of being in the profession (NÓVOA, 1992).

Thus, professional identity is understood much more as the result of a process of interpretation and reinterpretation of experiences about the profession than as a stable and permanent identity (MARCELO, 2009).

Studies on teacher training in Brazil (GATTI, 2019, p. 130) reveal that around 50% of undergraduate students drop out of the course during the process, and this “high dropout rates found in these courses” show that this evasion can “be explained by means of context variables, but which are also partly due to the dynamics intrinsic to its functioning”.

Some of these problems evidenced in undergraduate courses have already been pointed out by some authors (DINIZ-PEREIRA, 2000; PIMENTA, 2000; MELO, 2007), who mainly highlight: insufficient pedagogical training, the valorization of knowledge in the specific area and the emphasis on bachelor training. We consider that these aspects constitute challenges in the formative processes and can influence the construction of the teaching identity.

Studies on the construction of teacher identity found in the literature, in different areas of training and at different levels of education (LIMA, KOCHHANN, 2018; BRAGA, 2018; MORAIS, 2019), have shown the contribution of these studies to rethink the training processes of teachers in initial or continuing training.

In this perspective, this work presents the result of an exploratory study related to a master’s dissertation, carried out through a search in dissertations and theses, with the aim of providing an overview of the studies that focus on the teaching identity in the formation of Science, Biology, Physics and Chemistry teachers.

Although there is a vast literature on teaching identity, it is not intended to address and exhaust this entire universe of research, but, from dissertations and theses, to draw an overview of research on the teaching identity of teachers of these curricular components in the Brazilian context.

RESEARCH METHODOLOGY

This study on the teaching identity of Science, Biology, Physics and Chemistry teachers is characterized as an exploratory phase of a broader academic master's research that aims to investigate the process of building the personal and professional identity of teachers of Natural Sciences of public schools in a municipality located in the north of Brazil.

The literature review is an important phase that provides the researcher with "references to interpret and explore his/her research topic" (NÓBREGA-TERRIEN; TERRIEN, 2004, p.11). The literature review focuses on the results of studies about the problem investigated, allowing the development of the theoretical basis for supporting or analyzing the study by defining the central categories of the investigation.

Thus, in order to compose the overview of the research on teaching identity of teachers of the Science area in the Brazilian context, we focused on the works present in the Bank of Theses and Dissertations of the portal of the Coordination for the Improvement of Higher Education Personnel (Capes), whose productions are made available online. Although it was possible to consider other sources or materials, this choice was due to the fact that it is a library that gathers and makes available publications from different research and educational institutions of Brazil and, therefore, ends up concentrating much of the national scientific research production.

To compose the desired panorama, we crossed three data sources. First, a search was carried out in the Capes Thesis and Dissertations Catalog in September 2019, using a single search term: "Teacher Identity", resulting in 571 works found. We established a ten-year time frame (2008-2018) and after applying it, the search resulted in 500 works. For the selection of works, their titles, keywords and abstracts were read, and after this analysis we identified 20 works that focused on the Teaching Identity of Science, Biology, Physics and Chemistry teachers. However, it was only possible to locate 17 works out of the 20 initially identified.

In this bibliographic search, we found a master's dissertation entitled "The State of the Art on the Teaching Knowledge of Biology teachers (2005-2012)" by Bonfim-Silva (2015), in which we identified 7 papers on teacher identity of Science and Biology teachers that had not been found in the previous search, and for this reason these works were incorporated into the research. In another systematic review article found in the literature focusing on the scenario of research on Teaching Identity (ALMEIDA, PENSO, FREITAS, 2019), in which the data sources were articles, dissertations and theses in different databases, it was possible to incorporate 3 more papers, totaling 29, which met the initial search requirements. However, 4 studies were not found, neither on the Capes portal nor on the page of the graduate programs in which the studies were developed. After the duplicate studies in the three sources used were disregarded, the research corpus totaled 23 productions (theses and dissertations), as shown in Table 1.

Table 1 - Research Corpus

Sources	Catalog of Capes- Theses and Dissertations (2008-2018)	Review of Teaching knowledge (BONFIM-SILVA, 2015) (2005-2012)	Review of Teaching Identity (ALMEIDA, PENSO, FREITAS, 2019)
Works	20	8	3
Works found	16	4	3

Source: The authors (2020)

In the second stage, the works were categorized according to the following descriptors: research subjects' training area, research context, work objective, thematic focus of the research, concept of teaching identity adopted by the authors and the aspects of the different types of teaching identity identified in the productions. Such a set of descriptors was established based on similar studies present in the national literature, with the intention of providing greater coverage on the main characteristic aspects of the set of academic works that were being analyzed.

To analyze the research theme and the types of identity present in the construction of the teaching identity identified in the productions, we used the content analysis of Bardin (2016), which consists of three stages: 1) pre-analysis; 2) the exploration of the material and 3) the treatment of results, inference and interpretation (BARDIN, 2016, p. 125).

The pre-analysis consisted of a "fluctuating reading" of the abstracts of the productions found, seeking to identify the descriptors established to define the research overview. Then, from the exploration of the material, the units of analysis or record units were identified, which consisted of words, phrases or paragraphs of the works that were related to the descriptors of interest. Subsequently, these categories of analysis units or record units were categorized. Categorization is a process of comparing the units defined at the beginning of the analysis, taking into account the grouping of similar elements. Therefore, it was in this cyclical process that the categories, subcategories and their definitions were listed, which were established a priori.

The analysis of the research theme and the types of identity found in the productions was based on the categorization proposed by Almeida et al. (2019, p. 21-25).

In the last stage, the data obtained were processed and interpreted.

RESULTS AND DISCUSSIONS

In the search carried out, from the database used, 23 studies were found on Teaching Identity of Science/Biology, Physics and Chemistry teachers, as shown in Chart 1.

Chart 1 - Dissertations and theses found on the construction of the Teaching Identity of Science/Biological Science, Physics and Chemistry Teachers

Title	Type	Author
Professional Choice: A Matter of Identity	Dissertation	Brando (2005)
Social Representations and the Construction of the Teacher's Professional Identity	Thesis	Silveira (2009)
Teaching knowledge of undergraduate students and the search for professional identity	Dissertation	Santos (2009)
A study on the epistemology of education of Science teachers: evidence for the constitution of identities	Dissertation	Gimenes (2011)
Constitution of Teaching Identity in Memorials of Graduates of Natural Sciences and Mathematics at Distance Learning Course of UAB/MT	Dissertation	Santana (2012)
Aspects of the Construction of the Teaching Identity of Science and Biology Teachers, working in the State Public School of the Municipality of Porto Alegre, graduates from UFRGS	Dissertation	Ambrosini (2012)
Learning to teach in PIBID-Biology: a characterization through the focus of teaching learning	Dissertation	Moryama (2013)
Teaching Identity and Training: Memories and Narratives of Graduates of the 1st Class of Degree in Chemistry at a Public University of Agreste Sergipano	Dissertation	Brito (2013)
WE ARE WHO WE CAN BE...A study of teaching identities under construction in the Undergraduate Chemistry course of IFRJ	Dissertation	Beja (2013)
Construction of the Teaching Identity of Undergraduate Biology Students of a Distance Learning Course	Thesis	Costa (2014)
Social representations of undergraduate Chemistry students about being a teacher	Dissertation	Miranda (2014)
Mapping the professional identity of undergraduate Biological Science students: an actor-school study based on the Institutional Program for Teaching Initiation Scholarships	Thesis	Allain (2015)
The formative meanings of undergraduate students: socialization, learning and teaching identity	Thesis	Andruchak (2016)
The process of constructing teaching identities within the Institutional Program for Teaching Initiation Scholarships - PIBID/Biology	Dissertation	Eibel (2016)
Contributions of PIBID to the Construction of the Teaching Identity of the Chemistry Teacher	Dissertation	Obara (2016)
Study on the professional identity of the graduate student of the dual-degree course in	Dissertation	Souza (2016)

Title	Type	Author
Science: Biology and Chemistry/ISB/UFAM COARI-AM		
Life history and teaching profession: formative experiences and the constitution of identities in the context of educational reforms	Thesis	Demori (2016)
The Formation of Teaching Identity in the Context of PIBID: A Study in the Light of Relations with Knowledge	Thesis	Araújo (2017)
Degree in Science in the Context of UFPR-Litoral: Identity Processes in Initial Teacher Education	Dissertation	Picon (2017)
PIBID-UESB and its influence on the Constitution of the Professional Identity of Graduates of the Biological Science Course	Dissertation	Silva (2017)
Teaching identity and curricular policies: the professional belonging of the Chemistry teacher through the conversation circle	Dissertation	Carpenter (2018)
Compositions in Teacher Education: Directions of a (trans)formation in the Physics Teaching Initiation Program	Dissertation	Melo (2018)
The initial training of Science teachers in the supervised internship: understanding the teaching identity from the theory of social representations and the epistemology of Ludwik Fleck	Thesis	Takahashi (2018)

Source: The authors (2020)

In Chart 1 we could see that the first study found was carried out in 2005, and that more dissertations (16) than theses (7) were produced, considering the database used. It is also possible to verify that 2016 was the year that presented the largest number of works (5); following the years 2013, 2017 and 2018 with 3 works, respectively; and in the other years, production varied between 1 and 2 works. Between 2006 and 2008, and in 2010, no production was found.

Table 2 shows the areas of training of the research subjects.

Table 2 – Training/practice area of the research subjects

Training/Practice Area	Nº. of Works
Biology	8
Biology and Chemistry	1
Biology, Geography, Mathematics, Pedagogy	1
Biology, Geography, Mathematics, History, Languages	1
Science	3
Science and Biology	2
Science and Mathematics	1
Chemistry	5
Physics	1

Source: The authors (2020)

It is possible to verify that more work on teaching identity was found with Biology teachers, following Science and Chemistry, and only one work with Physics teachers was found.

Table 3 shows the context in which the subjects were inserted when the research was carried out.

Table 3 - Context in which the research subjects are inserted

Context	Nº. of works
Category 1: Initial training	17
Subcategory a) Supervised Undergraduate Internship	2
Subcategory b) Teaching Initiation Program (PIBID)	7
Subcategory c) Degree Course	8
Category 2: Initial and continuing training	1
Category 2: Professional Practice	5
Subcategory a) Continuing Education Course	1
Subcategory b) Acting in basic education	4

Source: The authors (2020)

We could see that of the twenty-three works found, the majority were developed in the context of initial teacher training, with 2 works within the scope of the supervised internship (SANTOS, 2009; TAKAHASSHI, 2018), 7 in the teaching initiation program-PIBID (MELO, 2018; ARAÚJO, 2017; SILVA, 2017; EIBEL, 2016; OBARA, 2016; ALLAIN, 2015; MORIYAMA, 2013), and 8 referring to the formative process within the degree course of interest (PICON, 2017 ; ANDRUCHAK, 2016; MIRANDA, 2014; COSTA, 2014; BEJA, 2013; SANTANA, 2012; GIMENES, 2011; BRANDO, 2005). We identified only 1 work developed with both teachers in initial training and professional teachers (CARPENTER, 2018). Regarding the work developed with teachers who work in basic education, we identified 5 works, of which 1 was developed with teachers who participated in a specialization course for Biology teachers, graduate students in Biology and Biology teachers in higher education (SILVEIRA, 2009); and other works with teachers who already worked in primary schools (DEMORI, 2016; SOUZA, 2016; BRITO, 2013; AMBROSINI, 2012).

In Chart 2 we present the objectives of the works found on the teaching identity of Teachers of Science, Biology, Physics and Chemistry.

Chart 2 - Objectives of dissertations and theses on the Teaching Identity of Science/Biological Science Teachers

Authors	Objectives
Brando (2005)	Evaluating which professional conceptions are being engendered by the students of the Undergraduate degree in Biological Science of UNESP/Campus Bauru during their initial training.
Silveira (2009)	Understanding the process of construction of the teaching identity of Higher Education teachers, graduate students and Basic Education teachers who make up the Medical Biochemistry Institute (IBqM) of UFRJ, based on their social representations, on the possible influences of their school histories and by observing their teaching practice.
Santos (2009)	Identifying and interpreting the knowledge about teaching built by the undergraduate students of the Biological Science course, from a public institution of higher education, during their first experiences in the internship and the role of this knowledge in the identification with the teaching profession.

Authors	Objectives
Gimenes (2011)	Investigating the teaching identity processes that are constituted in the context of the initial training of Science and Biology teachers, based on the epistemological foundation in three investigated sources
Santana (2012)	Investigating, in reflective records, the training memorials of undergraduate students of a distance learning course, what the subjects narrate about their perceptions of the movement of construction of their teaching identity during the process of becoming a teacher.
Ambrosini (2012)	Understanding some aspects related to the formation of the identity of Science and Biology teachers and, thus, contributing to the research on teaching identity.
Moryama (2013)	Characterizing teaching learning in PIBID-Biology through the learning focuses.
Brito (2013)	Understanding the construction of the teaching identity of the students entering the first class of the Undergraduate Degree in Chemistry of the Public University of Agreste Sergipano.
Beja (2013)	Investigating the process of identity construction that has been experienced by undergraduate Chemistry students at the IFRJ campus Duque de Caxias.
Costa (2014)	Investigating the discursive construction of the teaching identity of undergraduate students of a distance learning course in Biological Science, understanding identity together with the socialization processes and with verbal interactions in a given social context, constituted in dialogical relations with discourses associated with the formative context and/or other social contexts.
Miranda (2014)	Analyzing the formative meanings attributed by students graduating from the Biological Science Degree course linked to the construction of their professional teaching identity during the process of socialization and learning in the university environment.
Allain (2015)	Mapping the profile of graduates of the Biological Science course participating in PIBID and identifying, in the training experiences of these graduates, the composition of interests related to their teaching identity network.
Andruchak (2016)	Analyzing the formative meanings attributed by graduating students of Undergraduate courses (Biology, Mathematics, Languages and Pedagogy) linked to the construction of their professional teaching identity, during the process of socialization and learning in the university environment.
Eibel (2016)	Identifying and analyzing how the participation of students in PIBID activities in Biology has contributed to the formation of their professional identities.
Obara (2016)	Investigating the contribution of PIBID to the construction of teaching identity
Souza (2016)	Analyzing the formation of the professional teaching identity of the graduate student of the Dual-Degree Course in Science: Biology and Chemistry of the Institute of Health and Biotechnology of Médio Solimões (ISB/UFAM), in Coari-AM, from the perspective of the reflective teacher.
Demori (2016)	Understanding how teachers, who work in the second segment of elementary and high school in a state public school in the city of Campinas (SP), apprehend and signify their daily knowledge, their life trajectories, their academic training experiences and their social relationships in the construction of their identities.

Authors	Objectives
Araújo (2017)	Investigating which aspects influence the formation of the identity of the future teacher in the context of the Institutional Program for Teaching Initiation Scholarships (PIBID).
Picon (2017)	Studying the process of initial teacher training in the Undergraduate Course in Science of UFPR-Litoral, highlighting its peculiarities, seeking to analyze indicators that reveal possible contributions of identity elements (life history, training and pedagogical practice).
Silva (2017)	Analyzing how PIBID influences the constitution of the professional identity of undergraduates in Biological Science participating in the program.
Carpenter (2018)	Investigating how national curricular policies are understood by future teachers and by teachers working in the Chemistry discipline in relation to teacher autonomy and identity.
Melo (2018)	Investigating how the experiences lived in a teaching initiation program - PIBID - can influence the (trans)formation of Physics teachers with regard to "becoming" a teacher.
Takahashi (2018)	Investigating the influence of the Supervised Internship discipline for Science Teaching in a Biological Sciences Degree Course for the constitution and resignification of the teaching identity of the undergraduate students.

Source: The authors (2020).

From the objectives listed in Chart 2, it was possible to identify the centrality of the theme of teaching identity in the 23 productions analyzed; the results found are displayed in Chart 3.

Chart 3 - Centrality of the theme of Teacher Identity present in the research

Thematic Centrality	Authors
The construction of the teaching identity	Brando (2005), Beja, (2013), Costa (2014)
Training, professional performance and teaching identity	Santos (2009), Gimenes (2011); Santana (2012); Brito (2013), Moryama (2013), Souza (2016), Eibel (2016), Obara (2016); Picon (2016); Silva (2017), Araújo (2017); Melo (2018)
Aspects of teaching identity	Ambrosini (2012)
Meanings and (re)signification of teaching identity	Andruchaki (2016), Demori (2016)
The social representations constructed by teachers about the teaching identity	Silveira (2009), Miranda, (2013), Takahashi (2018)
Relations between teaching identity processes and curricular reforms	Demori (2016)
The controversy about professional identity	Allain (2015)

Source: The authors (2020)

We could see that most of the works have as a thematic focus the teaching identity in initial training and professional practice (12), which shows that there was a greater interest in investigating the implications of initial training or programs of initiation to teaching in the construction of identity of teachers or future teachers of Science, Biology, Physics and Chemistry. Following, 3 works were found with a focus on the analysis of the meanings that teachers attribute to the profession; 3 works that focus on studying the teaching identity from the social

representations on being a teacher or on the profession; and 3 works that studied the process of construction of the teaching identity by the research subjects. Research on the relationship between the construction of teacher identity and curricular reforms, the controversies in the construction of identity and the study of some aspects of teacher identity were the ones that appeared least, with one study each. No studies were identified with focus on stabilizing the teacher's identity in the teaching context; control devices, such as conservative regulation and its impact on the teaching identity; the concepts of identities and difference; and aspects related to identity and emotions, which were found in the systematic review conducted by Almeida et al. (2019).

Regarding the concepts of Teacher Identity adopted in the works, we can see in Chart 4 that the authors used a variety of theoretical references. Asterisks represent that in the case of works with the same title, but different editions, only one of them was mentioned.

Chart 4 - Concepts of Teacher Identity adopted in the works

Theoretical Reference	Concept	Authors
Hall (1997, 2001, 2003, 2006, 2011)	Identity is built through the feeling of belonging to different cultural, ethnic, racial, linguistic, religious and national dimensions. In this way, the changes that take place at the heart of cultures directly affect personal identity (ALMEIDA, PENSO, FREITAS, 2019, p.14).	Brito (2013) Beja (2013) Costa (2014) Eibel (2016) Souza (2016) Araújo (2017) Melo (2016) Picon (2017) Takahashi (2018)
Dubar (1997, 2005, 2006, 2012)	Identity formation is materialized by the combination of the attributions that the subject receives from the social and the feeling of belonging of the subject who identifies with the attributions received. Thus, attribution is the sense of identity arising from the social, while the feeling of belonging corresponds to identity for oneself (ALMEIDA, PENSO, FREITAS, 2019, p. 14).	Silveira (2009) Ambrosini (2012) Takahashi (2018) Eibel (2016) Andruchak (2016) Souza (2016) Araújo (2017)

Theoretical Reference	Concept	Authors
Nóvoa* (1992, 1996, 2007)	The teaching identity is a complex, dynamic and social construction. It is characterized by the way each one feels and says to be a teacher. It is constructed through postures produced individually and collectively, as a result of the dialogue between the individual's objective and subjective worlds, their daily working conditions, the imaginary about the teaching profession and the discourses that circulate in the social and cultural world of the school and teachers (NÓVOA, 1992).	Araújo (2017) Silva (2017) Santos (2009) Costa (2014), Obara (2016) Demori (2016) Melo (2018)
Pimenta* (1999, 2000, 2009, 2012); Pimenta and Anastasiou (2002)	The construction of teaching identities is based on the values of each one, on how each one builds her/his life story, on the way of situating her/himself in the world of each teacher, in her/his representations, in her/his knowledge, in her/his anxieties, in the meaning that being a teacher has in one's life (PIMENTA, 2000).	Costa (2014) Obara (2016) Moryama (2013) Souza (2016) Takahashi (2018) Santana (2012) Carpenter (2018)
Ciampa (1986, 1997, 1998)	A process of constant transformation, something temporary, resulting from the combinations of the subject's personal history with her/his socio-historical context and projects. It has a dynamic character in a movement that originates a character that corresponds to the personal experience of a role produced in advance and standardized by culture. It is built from the articulation between equality and difference (ALMEIDA, PENSO, FREITAS, 2019, p. 15).	Brando (2005) Eibel (2016) Araújo (2017) Silva (2017) Takahashi (2018)
Silva* (1995, 2011)	A dynamic fusion of features that unmistakably characterize, in time and space, a person, an object or any other concrete entity. Desires, actions, thoughts, feelings, etc. are conjugated or merged throughout the person's existence, allowing other people to differentiate and recognize them in society. Thus, identity, individuality and uniqueness have very close meanings whose nuances are difficult to discern (SILVA, 1995, p. 31-32).	Brando (2005) Costa (2014) Beja (2013) Eibel (2016)

Theoretical Reference	Concept	Authors
Baumann (2005)	The identity construction finds its base in the social interactions that generate stable bonds. However, this identity is only revealed in the midst of instability, giving it a character of ambivalence that seeks at the same time union and division, making inclusion and segregation a complementary dialectical pair (ALMEIDA, PENSO, FREITAS, 2019, p. 15).	Picon (2017) Araújo (2017) Eibel (2016) Takahashi (2018)
Melucci (2004)	Three characteristics are present in the individual or group identity: permanence, which is the continuity of the subject/group over time and in variations in the environment; the delimitation between subject/group that allows their distinction; and the manifestation of the ability to recognize and be recognized (ALMEIDA, PENSO, FREITAS, 2019, p. 15).	Eibel (2016) Araújo (2017)
Castells* (2000, 2008)	Identity is a process of construction of meaning based on a cultural attribute, or even a set of interrelated cultural attributes, which prevail over other sources of meanings. For a given individual or even a collective actor, there may be multiple identities (CASTELLS, 2008, p. 22).	Araújo (2017) Silva (2017)
Galindo (2004), Penna (1992)	Process of construction of subjects as professionals, marked by the contingency that impresses the opening that is characteristic of them. In the dynamics of this process, identity is inscribed in the recognition game, formed by two poles - that of self-recognition, how the subject recognizes her/himself and that of self-recognition, as she/he is known by others (GALINDO, 2004, p. 2).	Eibel (2016) Silva (2017)
Guimarães* (2005, 2010)	It is a process in which teachers build individually and collectively and which is closely related to the way the profession is represented. Thus, the characteristics that the teaching profession has acquired historically and the objective forms that contributed to these characteristics to be formed are interdependent (GUIMARÃES, 2010, p. 59).	Santana (2012) Costa (2014)

Theoretical Reference	Concept	Authors
Garcia* (2005, 2010)	A process of identification and differentiation, not fixed or provisional, resulting from symbolic negotiations that teachers carry out amid a set of variables such as their biographies, relationships and working conditions, history and culture that characterizes teaching as a professional activity, and representations put into circulation by speeches that dispute the ways of being and acting of teachers in the exercise of teaching (GARCIA, 2010, p.1).	Eibel (2016) Allain (2015)
Gee (2000, p. 103)	Type of person that someone is looking for to be recognized in a given context. Identity is socially situated, that is, people assume multifaceted identities in different practices and contexts (CARPENTER, 2018).	Carpenter (2018) Allain (2018)
Veiga (2009)	A construction that permeates the professional life from the very moment of choosing the profession, passing through the initial training and the different spaces, institutions where the profession is developed, which gives it a dimension in time and space. It is built on professional knowledge and on ethical and deontological attributions (VEIGA, 2009, p. 29).	Santana (2012)
Marcelo (2009)	The teaching identity is based on the identifications that are established in the field of activity of this profession, passing through the initial training and the different institutional spaces in a spatial and temporal dimension (MARCELO, 2009).	Silva (2017)
Tardif (2002)	The teaching identity is constituted from the exercise of teaching leading the subject to become a teacher (TARDIF, 2002).	Brito (2013)
Latour (2008)	Identity is constituted by learning to be affected by the bonds between people and things (which put us) in motion. The notion that reality is the result of connections, of bonds between actors, including people and things, has fundamental impacts for the understanding of identity (ALLAIN, 2015, p. 74).	Allain (2015)

Theoretical Reference	Concept	Authors
Rosa et al. (2008) Nascimento (2007)	Process that is built through practical experiences and identifications with the discourses in dispute in the social groups that she/he attends, including in the professional environment, being in the degree courses, the developed curriculum, privileged place of the processes of identity construction. In this way, the teaching professional identity is configured based on the life story, knowledge, values, desires, conceptions of the world, of doing and being a teacher (SOUZA, 2016).	Souza, 2016
Santos (2005)	Unique characteristic of an individual that distinguishes oneself from the other, paradoxically, implies a duality: personal identity (or identity for oneself) and identity for others (SANTOS, 2005, p. 123).	Takahashi (2018)

Source: Elaborated by the authors based on Almeida, Penso, Freitas (2019).

It is possible to observe that of the 23 works analyzed, only 1 did not present the concept of teacher identity (GIMENES, 2011). In this work, the author investigates the epistemology of practice in the training process of undergraduate Biology students to analyze the identity processes, and for this, is based on Vázquez (1987). The author considers that depending on the epistemology that underlies the formative process, the logic of action will be different and, for this reason, the construction of identity processes will be differentiated. However, no theoretical reference on teaching identity was found in the work.

The most used concepts in the works were by Hall (8), Dubar (7), Nóvoa (7) and Pimenta (7), which demonstrates that several authors also brought theorists from sociology to reflect on the concept of identity. Although the theorist Ciampa, whose concept of identity appeared in 5 works, has his studies based on social psychology, his conception of identity is similar to that of Baumann, who appeared in 4 works and that of Stuart Hall. For these theorists, identity is conceived as a process of reformulation and change due to historical and social influences, whereas Nóvoa and Pimenta deal more specifically with the definition of the teaching identity. Other references in the field of sociology and social psychology were also found, such as Melucci (2004), Castells (2000) and Galindo (2004), which were used in 2 works each. Other definitions used in 2 works were that by Penna (1992) and Guimarães (2010). The authors who were least used and cited in only one study were: Veiga (2009), Marcelo (2009), Tardif (2002), Garcia (2010), Latour (2008), Nascimento (2007), Rosa et al. (2008), Gee (2000) and Sá (2009).

Regarding the descriptor related to the analysis of the results of the productions found, we established the analysis category "Types of Teaching Identities" defined a priori, based on the work of Almeida et al. (2019, P. 17-21), who listed 4 types of identity, whose definitions and subcategories are found in Chart 5.

Chart 5 - Definitions and subcategories of Types of Identity

Types of Identities	Characteristics	Subcategories
Missionary	It gives the teacher a position of prestige for being entrusted with transmitting the moral values of society under the pillar of a Christian philosophy, with the mission of the task of “herding the straying sheep”.	<ul style="list-style-type: none"> Redeeming vision Feminine role Power and prestige
Instrumental	Understood as the identity forged from the regulation of the State as a measure of social control. The teacher is conceived as an instrument for transmitting the knowledge defined by the State regulations. In this case, the social relations that are established are based on heteronymy to the detriment of autonomy. That is, the teacher having to obey State control regulations assumes the role of social regulator in the relationship he/she establishes with students in the exercise of their function.	<ul style="list-style-type: none"> Functionalist view Centralizing posture State Control
Proletarian	Linked to the foundations taken from Karl Marx’s theory, which founds Historical Materialism, when analyzing the relationship established between boss and employee in the capitalist industrial system to which the proletarian sells his/her productive force within a regime of exploitation and alienation.	<ul style="list-style-type: none"> Salaried employee Class struggle Precarious working conditions
Professional	Linked to the work activity based on a set of knowledge, skills and abilities that define it as specific characteristics that differentiate it from other groups, thus assessing the feeling of belonging to a certain professional category.	<ul style="list-style-type: none"> Profession-specific skills and abilities Interactionist view of teaching learning Profession’s name Political vision of education Class consciousness Feeling of belonging and affection

Source: Elaborated by the authors based on Almeida, Penso, Freitas (2019, p. 21-25)

In Chart 6 we present the types of Identity found in the results of the 23 studies analyzed, according to the categories and subcategories defined a priori.

Chart 6 - Types of identity found in the analyzed productions

Identity Types / Characteristics	Authors
Missionary	
Redemptive, vocational, gift vision	Brando (2005), Miranda (2009), Ambrosini (2012), Moryama (2013), Brito (2013), Beja, (2013), Costa (2014), Demori (2016), Takahashi (2018)
Feminine role	Demori (2016)
Power and prestige	Brando (2005), Santos (2009), Gimenes (2011), Takahashi (2018)
Romantic vision, act of love, passion	Santana (2012), Carpenter (2017), Takahashi (2018)
Instrumental	
Functionalist view	Brito (2013), Costa (2014), Demori (2016), Picon (2017), Carpenter (2017), Takahashi (2018)
Centralizing posture	Brando (2005), Brito (2013), Demori (2016), Carpenter (2017), Melo (2018)
State Control	Demori (2016), Picon (2017), Carpenter (2018)
Proletarian	
Precarious working conditions	Santos (2009), Gimenes (2011), Ambrosini (2012), Brito (2013), Miranda (2013), Demori (2016), Silva (2017)
Discredit, devaluation of the workforce	Brito (2013)
Professional (23)	
Profession-specific skills and abilities	Silveira (2009), Santos (2009), Miranda (2013), Gimenes (2009), Santana (2012), Ambrosini (2012), Moryama (2013), Brito (2013), Beja (2013), Allain (2015), Andruchak (2016), Eibel (2016), Obara (2016), Souza (2016), Demori (2016), Araújo (2017), Picon, (2017), Silva (2017), Carpenter (2017), Melo (2018), Takahashi (2018)
Profession's name	Santos (2009), Gimenes (2011), Ambrosini (2012), Brito (2013), Miranda (2013), Demori (2016), Picon (2017)
Political vision of education	(Brito, 2013)
Feeling of belonging and affection	Allain (2015), Eibel (2016), Picon (2017), Silva (2017), Takahashi (2018)

Source: Elaborated by the authors based on Almeida, Penso, Freitas (2019, p. 17-21)

According to Chart 6, it is possible to verify that the types of identities that emerged among the research subjects were the professional, which appeared in 23 works; the missionary, in 12 works; the instrumental, in 8 works; and the proletarian, which was verified in 7 works. Regarding the subcategories, it was found that more than one of them was evidenced in the same study; with the exception of the following subcategories: "Feminine role", relating to the Missionary identity category that was observed only in the studies by Demori (2016); "Discredit, devaluation of the workforce" related to the "Proletarian"

identity category; and “Political vision of education” referring to the “Professional” identity category, which stood out only in the study by Brito (2013).

We consider that the professional identity being the one that most emerged in the analyzed productions, denotes that, for the research subjects, the teaching identity is more linked to the necessary attributes to develop the teaching work. The subcategory “profession-specific skills and abilities” appeared in 21 works (SILVEIRA, 2009; SANTOS, 2009); (MIRANDA, 2013; GIMENES, 2009; SANTANA, 2012; AMBROSINI, 2012; MIRANDA, 2013; MORYAMA, 2013; BRITO, 2013; BEJA, 2013; ALLAIN, 2015; EIBEL, 2016; ANDRUCHAK, 2016; OBARA, 2016; SOUZA, 2016; DEMORI, 2016; ARAÚJO, 2017; PICON, 2017; SILVA, 2017; CARPENTER, 2017; MELO, 2018; TAKAHASHI, 2018). The subcategory “profession’s name” appeared in 7 productions (SANTOS, 2009; GIMENES, 2011; AMBROSINI, 2012; MIRANDA, 2013; BRITO, 2013; DEMORI, 2016; PICON, 2017), and refers to the teaching commitment to social transformation of the student, and is established in opposition to the missionary identity. The subcategory “feeling of belonging and affectivity”, in the way of perceiving oneself as a teacher, appeared in 5 works (AMBROSINI, 2012; ALLAIN, 2015; EIBEL, 2016; PICON, 2017; SILVA, 2017; TAKAHASHI, 2018); and the subcategory “political vision of education”, in Freire’s perspective, understood as that which intends to free the student from oppression, through the development of criticality and autonomy (ALMEIDA, PENSO, FREITAS, 2019), appeared in only one of the works (BRITO, 2013).

Few works resulted in the teaching identity related to the profession’s name (7); also only one work identified, as one of the professional competencies, the commitment to the subjects’ emancipation. It is inferred that these discussions are not being intensified in teacher training, or that the studies have not been concerned with investigating this aspect of the profession.

The subcategory “interactionist view of learning” was not identified in any production; this subcategory is related to the learning of the profession from the social interaction of teachers with their peers. We also did not find the subcategory ‘class consciousness’, which according to Almeida, Penso, Freitas (2019, p. 26) is related to “the recognition that society is historically marked by differences in opportunities characterizing social inequalities”.

Of the 12 works classified in the “missionary” identity category, the subcategory “redemptive vision” was identified in 9 of them (BRANDO, 2005; MIRANDA, 2009; AMBROSINI, 2012; MORYAMA, 2013; BRITO, 2013; BEJA, 2013; COSTA, 2014; DEMORI, 2016; TAKAHASHI, 2018), in which the teaching profession is conceived as a gift, as a vocation or that the teacher is considered a hero, since he/she has the role of rescuing the underprivileged. In the subcategory “power and prestige”, 4 works were classified (BRANDO, 2005; SANTOS, 2009; GIMENES, 2011; TAKAHASHI, 2018); this subcategory is understood as the one that considers that the teacher profession is configured as a prestigious profession, since it has the function of transmitting the moral values of society. The subcategory “romantic vision, act of love, passion for the profession” was included when identified in 3 works (SANTANA, 2012; CARPENTER, 2017; TAKAHASHI, 2018), and that the research subjects considered that in order to exercise the teaching profession much love and passion for the profession is needed. And the subcategory “feminine role” was found only in one paper (DEMORI, 2016), in which the option

for the teaching profession is identified as one that allows conciliating the role of wife/mother with the profession.

In the category “instrumental identity”, 6 works were found - classified in the subcategory “functionalist view” (BRITO, 2013; COSTA, 2014; DEMORI, 2016; PICON, 2017; CARPENTER, 2017, TAKAHASHI, 2018), in which the teacher has the role of transmitting knowledge established by the State guidelines, in which case the importance of teaching the contents prevails at the expense of the subjectivity involved in the teaching-learning process. The subcategory “centralizing posture” was identified in 5 productions (BRANDO, 2005; BRITO, 2013; DEMORI, 2016; CARPENTER, 2017; MELO, 2018); in these productions, the teacher is considered the central figure in the teaching-learning process and the focus is the teaching of content out of context of the students’ social reality, and for that the teacher exercises control of the class. The subcategory “State control” appeared in 3 works (DEMORI, 2016; PICON, 2017; CARPENTER, 2018); in this subcategory were the works in which the teacher is recognized by the State as “a transmitter of knowledge from a utilitarian vision of teaching, as an instrument of social control, and having his/her autonomy denied, reproducing it with his/her students” (ALMEIDA, PENSO, FREITAS, 2019, p. 24).

In the “proletarian identity” category, the results showed two subcategories. The first, ‘precarious working conditions’, was identified in 7 studies (SANTOS, 2009; GIMENES, 2011; AMBROSINI, 2012; BRITO, 2013; MIRANDA, 2013; DEMORI, 2016; SILVA, 2017) and the second, “discredit, devaluation of the workforce”, appeared in only one work (BRITO, 2013). These subcategories arise from the recognition by the research subjects, that the teaching profession has no social recognition, and that for this reason they are underpaid, which leaves them overburdened, and that their workplace does not provide adequate infrastructure for their professional practice.

From the data presented, it was possible to verify that, in the missionary identity category, the subcategory that most prevailed was the “Redemptive, vocational, gift”. In the instrumental identity category, two subcategories were equally representative: “the functionalist view” and “State control”. In the category of proletarian identity, the sub-category “Precarious working conditions” was the most prominent in the studies. In the professional identity category, evidenced as the most representative of all identities for having been scored in all studies, the most expressive subcategory was “profession-specific skills and abilities”.

FINAL CONSIDERATIONS

Although the limitation of the present study is recognized, since it did not contemplate the totality of the national production regarding the theme of teaching identity, it was possible to draw an overview of the studies focusing on the Teaching Identity of Science, Biology, Physics and Chemistry teachers, from the information sources used.

It was possible to verify that the Teaching Identity has been constituted as a theme of interest by researchers in the area of education and Science teaching,

within the field of research on teacher education - either to provide subsidies on teacher training processes, or to understand aspects of teaching practice.

It was found that most studies were carried out with teachers of Biology, Science and Chemistry and that the thematic focus of the teaching identity prioritized in the works was the initial training and professional performance; also that most of the production was carried out in the context of initial training. It points out the lack of studies with teachers of these curricular components who already work in basic education, as well as with different times of professional experience.

In relation to the concepts of teacher identity contemplated in the studies, it was possible to identify a diversity of authors elected to reflect on the identity processes, especially those that discuss the concept of identity in the social and social psychology perspective, as well as authors that conceptualize, more specifically, professional identity.

The results indicated that the identity that most emerged from the studies was that related to professional identity, which is linked to the activity of teaching work, and which encompasses a set of competencies and skills necessary for teachers, what ends up giving a feeling of belonging to the professional teaching category.

Some gaps could be identified in the production of the area, such as few studies that relate the identity processes and curricular reforms, such as the Common National Curricular Base for the teaching of Natural Sciences and its Technologies (2017) for Basic Education and the new High School, which recommends different training itineraries. It is considered that what is recommended in these documents, can, to some extent, promote the destabilization of teachers' identity in the teaching context, especially those related to the Natural Sciences.

Another gap identified was that of research on teaching identity and its relationship with educational technologies, whose use in schools has long been recommended in official documents for Basic Education, as well as in official documents for teacher training. Nowadays, this demand has appeared unexpectedly, and it has caused an evident malaise among teachers, as they have been assigned a role which has put their professional competence in check. For Dubar (2005), the formation of identity is materialized in a movement that brings together the attributions that the subject receives from the social and the feeling of belonging of the subject that identifies with the attributions received. Thus, the attribution is in the sense of identity coming from the social, while the feeling of belonging corresponds to the identity for oneself, and these "changes that take place at the heart of cultures directly affect personal identity" (HALL, 2006).

We conclude that research on the construction of the teaching identity should be stimulated, considering that these may bring important subsidies for a broader reflection of the training processes and ways to minimize dropout in the undergraduate courses in Biological Science, Chemistry and Physics, as well as indicate ways to minimize the shock with the reality of the profession in the first years of the teaching professional career.

Panorama das pesquisas sobre a identidade docente de professores de ciências, biologia, física e química

RESUMO

Este artigo tem como objetivo apresentar um panorama das pesquisas nacionais sobre a identidade docente de professores da área de Ciências, a partir de dissertações e teses. Para atingir esse objetivo foi realizado o cruzamento de informações de três fontes de dados: um levantamento realizado no Banco de Teses e Dissertações da Capes estabelecendo um recorte temporal de dez anos (2008-2018), um artigo de revisão sistemática sobre Saberes Docentes (2005-2012), e por fim, um artigo de revisão de literatura sobre Identidade docente publicado no final de 2019. O cruzamento de dados permitiu identificar e localizar um total de 23 trabalhos que atendiam aos critérios de interesse da pesquisa. Para traçar o panorama pretendido, as produções encontradas foram caracterizadas em relação à área de formação dos sujeitos das pesquisas, ao contexto de atuação dos pesquisadores, aos objetivos dos trabalhos, o conceito de identidade utilizado, e os tipos de identidades encontradas. Os resultados apontaram que a maioria dos estudos foi realizada com professores de Biologia/Ciências e Química; que o foco temático da identidade docente priorizado nos trabalhos foi a formação inicial e a atuação profissional; e que a maior parte da produção foi realizada no contexto da formação inicial. Em relação aos conceitos de identidade docente que emergiram nas pesquisas, foi possível constatar uma diversidade de autores utilizados para refletir sobre os processos identitários, principalmente aqueles que discutem o conceito de identidade na perspectiva sociocultural e da psicologia social, bem como autores que conceituam, mais especificamente, a identidade profissional. Os resultados indicaram que a identidade que mais emergiu dos estudos realizados foi a identidade profissional, a qual está vinculada à atividade do trabalho docente, e que engloba um conjunto de competências e habilidades necessário aos professores para sua atuação profissional. Algumas lacunas nos estudos foram constatadas, como: apenas um estudo com professores de Física; poucos estudos que relacionam os processos identitários e as reformas curriculares; nenhum estudo sobre as implicações do uso das tecnologias educacionais na identidade docente; e a avaliação da identidade profissional relacionada à valores e sentimentos.

PALAVRAS-CHAVE: Identidade docente. Formação de professores. Biologia. Física. Química.

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NOTES

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