A Longitudinal Study on the Development of the Professional Identity of Future Physics Teachers

Jéssica dos Reis Belíssimo [a] and Roberto Nardi [b]
Corresponding author: Jéssica dos Reis Belíssimo (jessica.belissimo@unesp.br)
[a] São Paulo State University (Unesp), School of Sciences, Postgraduate Program in Science Education, Bauru, São Paulo, Brazil. https://orcid.org/0000-0001-9900-7517
[b] São Paulo State University (Unesp), School of Sciences, Education Department, Bauru, São Paulo, Brazil. https://orcid.org/0000-0002-5018-3621

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Abstract

This article derives from a master's thesis that sought to understand some aspects of physics undergraduates' conceptions of scientific knowledge, science teaching, and the process of knowledge construction for teaching. This study is longitudinal; data were collected from admission to course completion with the goal of understanding the impact of the pedagogical project and course structure. The Pecheutian Discourse Analysis provided theoretical and methodological support for the development of this research. The analysis of the interviews and questionnaires revealed that the course's pedagogical project and curricular structure play an important role in the changes in the conceptions of future Physics teachers and the construction of their teaching identity.

Introduction

Investigations into initial teacher training and how research findings can be used during initial training have been mobilised by both Brazilian and international researchers, sparking discussions at a global level.

McIntyre (2005), for example, has studied how to bridge the gap between research and practise. Galamba (2018) discussed the training of England's teachers to bring university-developed content and practises closer to educational practise, with the goal of facilitating and strengthening the university-school partnership. Habermas, also, discusses the need to understand the dialectic between theory and practise for a critical reflection about the social and political questions present in the teacher action.

In Brazil, such discussions have become more prevalent in the context of teacher education, with several authors discussing the relationship between theory and practise. Among them, Lüdke & Cruz (2005) studied the relationship between teachers, their knowledge and their practise, seeking to bring the research produced at the university to the elementary and high schools. André (2013, p. 61) investigated different ways of articulating teaching and research in teaching training and practice, emphasising the importance of research in teacher training. Pimenta and Lima (2010) examined the role of theory and practise in the formation of teaching identity, viewing the teaching profession as a social practise.

These discussions are based on and derived from several theoretical references on teacher education (Contreras, 2006; Gauthier et al., 2013; Giroux, 1997; Nóvoa, 2007), considering a variety of concerns that coexist with common sense conceptions about the teaching profession

and teaching and learning processes, which are present in the academic environment (between undergraduates and teacher trainers) as well as in elementary school teachers.

From this standpoint, the current study aimed to investigate particular aspects of the training process of Physics teachers, particularly research in Physics education, and to identify how the process of professional identity occurs among prospective teachers. Understanding the scope of the investigation, the following research question was established: How do undergraduates in Physics' conceptions of scientific knowledge, science teaching, and the process of constituting knowledge for teaching change over the course of the degree, while building their professional identity?

This research was conducted in the context of a Physics Licentiate course at a public university in São Paulo. The research data was compiled through annual questionnaires completed by graduates from the time when they enter the university until the end of the course, as well as semi-structured interviews at the end of graduation. The theoretical and methodological framework of Pecheutian Discourse Analysis, along with some references from the field of teacher education, were used to answer the research question (Freire 2020, Gauthier et al. 2013; Giroux 1997; among others).

Teacher education and teacher professional identity

Studying teacher education necessitates an awareness of how the field is influenced by a variety of historical, political, social, and cultural factors. According to Adorno (1996), education is the subjective appropriation of culture in which the individual is aware of their historical and social function, as well as their place in each community. The individual contributes to and subjectively appropriates the culture of the society in which they live via their contact with the actual and collective reality.

When considering the social and cultural components of teacher education, the training process begins to appear incomplete and under development—something in constant construction. As Freire (2020, p.25) puts it, "those who teach, learn by teaching; those who learn, teach by learning".

Understanding teacher training from this perspective is crucial to understanding that it extends beyond training a single individual; it develops from a collective perspective, expressing experiences in diverse domains and training environments. "Training seeks the emancipation and consolidation of an autonomous professional collective that builds its own knowledge and values", writes Veiga (2008, p.17).

Since technical rationality was present during the country's consolidation and improvement of the area of teacher training, particularly during the military dictatorship, the models of teacher training in Brazil were characterised by these assumptions. This kind of rationality carries a positivist understanding of instructional action. According to Saviani (2007), the experimental/instrumental/pragmatic dimension is central to technicist rationality, which prioritises the development of skills and abilities in both teachers and students. In this sense, the primary goal of education is efficiency and productivity.

The model's limitations, particularly those related to practise reflection, have come under scrutiny as research into it has advanced. According to Contreras (2006), Schön's model is primarily criticised for tying reflection to a stifling and individualistic exercise in the

classroom. In this kind of exercise, the teacher overlooks the effects of the school's reality in a broad context that is called into question by history and ideology.

Representing the teacher in training as a critical intellectual is used as a foundation in this context, which problematizes their training and teaching action through dialectical reflection as a historical and transformative being. As a critical intellectual, the teacher can comprehend the individual and social components of their profession and, based on their practical experience, or praxis, they mobilise fundamental teaching knowledge to create their professional identity.

In this way, the dialectic of identity is made clear because identities are constructed as a result of the interaction between individual and social processes. According to Nuñez and Ramalho (2005, p.97), "teachers build their personal identities in their group and contexts, in interaction with other professional groups". Teachers create representations of themselves and the group into which they are inserted during this construction process, taking into account both the standards that guide their professional practise and certain aspects of their collective history.

According to Nóvoa (2007, p.17), the teaching professional identity is related to "the ability to exercise our activity with autonomy, through the feeling that we control our work". The concept of teacher identity relates to something that evolves and develops individually and collectively. Therefore, identity is something that is constantly changing and is not a fixed attribute of an individual subject, but rather a relational phenomenon.

In this conjuncture, it is understood that the construction of the professional identity is influenced by the social function of the profession, the standards that delineate teaching professionals, the culture of the groups in which the teachers belong, as well as the socio-political environment in which it takes place. Veiga (2008, p.17) states that the construction of the professional identity is based upon the meaning of the professors' demanding movements and on the meaning that the professional gives to their work

Within the purview of such discussions, it is known that the building process of the subjects' professional identity is, above all, dependent on an oppressive imposition of the division of labour, historically organised by the political, economic, and ideological contexts present in society.

As Carvalho (2016) points out, within these contexts, professional identities start to incorporate "personifications of capital", since they follow capitalist logic and work together to preserve bourgeois privilege. In other words, assigning the role of shaping students' ideologies and promoting individualism in teachers can have far-reaching effects, including increased competition among workers and a potential weakening of collective identity—which can eventually lead to social and class struggles.

Workers' individual self-representation is directly impacted by the identities created within the context of the division of labour because, according to capitalist logic, representations of their identities must necessarily depend on what they produce, how they produce it, and whether they comply with capital's designs. Carvalho (2016, p.222) claims that this research demonstrates how identity construction is closely tied to human identification, making it primarily cultural, historical, and defined by the conditions of production.

The composition of research data and Pecheutian Discourse Analysis

As various studies in Brazil have studied and expanded throughout the years, Michel Pêcheux (1938–1983) served as the primary instructor of Discourse Analysis (DA) in the French line. Thus, the works of Orlandi (2015) and Pêcheux (2002) were mostly utilised in this study. Orlandi (2015) claims that DA is a suggestion for contemplation on language, the subject, history, and ideology. Pêcheux and his associates' development of the DA started with the articulation of three fields of knowledge: Linguistics, Marxism and Psychoanalysis. According to Pêcheux (2002, p.45), this trilogy was motivated by the promise of a "cultural revolution, which calls into question the evidence of the human order as strictly biosocial".

Based on these areas of knowledge, DA tries to move away from language as a mere conveyance of information by considering the concept of discourse defined as the consequences of meanings between interlocutors, who are understood as subjects affected by history and the symbolic. The notion of discourse is, therefore, directly related to one of the instances in which ideological materiality is consolidated. As a result, the most immediate context is defined as the conditions of discourse formation in a more specific sense, and the socio-historical and ideological framework is described in a more general sense.

When considering DA as a theoretical and methodological reference, it is essential to realise that language, meanings, and subjects are not transparent; rather, they are constituted by their materiality and by the collaborative construction of language, history, and ideology. From this vantage point, the subsequent subtopics will go over the circumstances surrounding discursive production and the structure of the research corpus.

Research production conditions

Three axes make up the curriculum of the physics degree programme that was analysed. Axis 1 is devoted to "the specific contents of Physics, Chemistry, Mathematics, Computing and other related matters, necessary for the formation of physicists and Physics teachers" and is titled "Formation of Basic Knowledge of Physics and Related Sciences and their Mathematical Instruments". Axis 2 is concerned with "the didactic-methodological knowledge of the specific content related to the exercise of teaching", and it is called "the formation of the didactic-pedagogical knowledge of the Physics teacher". Axis 3, "Science, Technology, Society, Environment, and Human Development", aims to promote understanding of science, society, people, schooling, and teachers.

In addition, the course also has an articulating axis that is composed of the five disciplines of Physics Teaching Methodologies and Practices (named I, II, III, IV and V) and the disciplines of Supervised Curricular Internships (I, II, III and IV).

Constitution of the research corpus

Research data were created from a longitudinal perspective. Flick (2013) asserts that longitudinal studies are important for the advancement of research that focuses on the historical comprehension of the sociocultural structure of a given group. This viewpoint divided the data's constitution into two phases.

In the first, questionnaires were used to collect responses from students registered in a physics licentiate course in March 2014 and at the start of each subsequent year (2015, 2016 and 2017). In the second phase, graduates who completed the course were interviewed.

The first questionnaire was applied during a Physics Teaching Methodology and Practice (PTMP) I class in 2014. The study was consented to by 49 of the 60 students who registered for the course. In 2015, because only 11 of the initial sample of the study's undergraduates responded to the questionnaires, a new one was used at the start of the semester in the PTMP III discipline. A similar survey was distributed at the start of PTMP V in 2016, but only eight students responded. Finally, in the course entitled Didactics of Science, only three of the applicants from 2014 responded in 2017.

As a result, the interviews were conducted with these three graduates, who were involved in the entire data collection process. This drop in participation was caused by the fact that some students failed, dropped out, or chose to follow only the curricular structure of the bachelor's degree course, even though entry into the course is common for both modalities.

The conceptions of future Physics teachers

The data in this study were analysed using an analytical device geared at contemplating, through theorization, and revealing, through description, the consequences of understanding.

It is "working the intermittency between description and interpretation that both constitute the analyst's process of understanding", writes Orlandi (2015, p.60). Thus, the analytic device for this study was developed in a particular way, with the goal of examining the answers done by three Physics graduates who participated in all steps of data construction.

Research participants as social and historical entities

When considering DA as a theoretical and methodological reference, it is essential to realise that subjects are constituted from their materiality and the joint construction of history and ideology. The histories of Caio, Sara, and Lucio, the three Physics graduates who took part in the research, must therefore be understood.

Caio attended a private school in the Bauru region for his basic education, from kindergarten to the end of high school. After completing high school, he joined a preparatory course for college entrance exams. In 2014, Caio began teaching at a local school shortly after beginning the course. He began to combine teaching with initial supervised research in Biophysics in subsequent years (2015, 2016 and 2017). After earning the degree, the participant proceeded to a programme for an academic master's degree in Biotechnology while still practising teaching by instructing Physics and Mathematics in a local private school. In his identification, Caio describes himself as having completed a physics degree and being a Master's student in the Biotechnology programme at a public university in the region.

Sara finished her basic education in the public school system. She spent a year after graduating from high school studying for the entrance exam, attending biweekly Physics classes on Saturday afternoons and evenings. She began working on an extension project at the university's astronomical observatory as soon as she registered in the course in 2014. She then developed various activities at the observatory in the years that followed (2015-2020), including monitoring services for students in basic education, lectures and workshops on telescopes and their affordability. However, due to the pandemic context in 2020, these

activities were put on hold. Finally, it is significant to note that Sara was completing her final undergraduate courses in August 2020 when the interview was conducted, and she received the degree in early 2021.

In his hometown, Lucio attended a private school for his elementary education. Soon after finishing high school, he registered in in a physics course. Between the second and third years of the course, he engaged in CI research in the field of materials science (2015 and 2016). He graduated with a degree in physics in 2018. He is currently pursuing a master's degree in materials sciences, and he works as a researcher in the "material modelling area". In his identification, Lucio describes himself as a physics graduate, a master's student in materials sciences, and a bachelor's degree holder in materials physics.

Understanding the stories of Caio, Sara, and Lucio, as well as the opacity of language, the determination of meanings by history, the constitution of the subject by the unconscious, and ideology, it was possible to analyse these individuals' discursive productions within the context of language transparency.

Discursive productions on the teaching of science, the construction of knowledge for the classroom, and the teaching profession

The discursive works that would make up the analysis corpus were chosen based on their qualities. According to Orlandi (2015, p. 61), "it is considered that the best way to address the question of the constitution of the corpus is to build discursive assemblies that comply with criteria that derive from theoretical principles of Discourse Analysis, given the objectives of the analysis".

In light of the research's goal, the first discursive montage to be examined aims to comprehend undergraduates' conceptions of science, the advancement of scientific knowledge, and its impact on society both during their initial training and after the course is over. A sample of the undergraduate student's questionnaire responses from their graduation course are shown in Table 1 below.

Table 1 - Answers to the question "In your opinion, what is Science, how does it develop and what is its contribution to our society?"

Students	Answers to the question (2014 – freshman, 2015 second year, 2016 third year, 2017 last year)
Caio	2014: *Science is the study of our surroundings.* 2015: *Science is extremely difficult to define. Several theories try to define it, and all have their positive and negative points (Inductivism, Falsifications...).* 2016: *It is difficult to define science, but it is composed of explanatory models of the universe [...] Such models are changeable, they are not an absolute truth, but they work and make sufficient predictions for current knowledge.* 2017: *[...] develops through models that are replaced or improved considering new evidence. Without science, we would still be living in caves.*
Sara	2014: *Science for me is the study of nature, phenomena, technology.* 2015: *Science is the study of nature; it develops over the years with research proving that nothing is absolute.* 2016: *[...] it develops in conjunction with the evolution of society, its needs, and its ambitions, that is, of extreme importance.* 2017: *[...] their studies have a direct impact on society, to help and understand certain situations.*
Lucio	2014: *Science finds a way to explain to man how things happen.* 2015: *Science would be something related to how nature behaves.* 2016: *Science is responsible for demonstrating everything that happens, what happened until reaching this result.*

	2017: *Science is related to everything around us, training, development, and others [...] Contribution to a better society, greater comfort and improvement for human beings and the environment.*

Since Caio and Sara began incorporating elements of History and Philosophy of Science (HPS) into their discourses in the second year (2015), it is possible to recognise the marks of the course disciplines in their discursive materiality.

By using the terms in parentheses, *"(Inductivism, Falsifications...)*", Caio brings up discussions covered in HPC classes that use the book "What is science after all?" by Alan Chalmers as study material. This book offers two straightforward but insufficient accounts of science, which it refers to as inductivism and falsifications.

Sara, by stating that Science "*develops from the years with research proving that nothing is absolute*", the participant gives evidence that she views Science as changeable and constantly evolving. This conception corroborates the objectives of the HFC course's syllabus, which seeks to enable undergraduates to understand Physics as a science under construction and to analyse various knowledge validation discourses over time.

In Lucio's discursive productions, it is discernible that beginning in his third year (2016), he starts to incorporate some elements learned in the disciplines of axis 2 and 3 of the degree course in Physics into his discursive materiality. In 2016, when he stated that "science is responsible for demonstrating everything that happens, what happened until reaching this result", he implied that Science is related to the scientific methodology for disseminating results, showing that he understands it as something built collectively.

The practise of Methodology and Practice of Teaching Physics II, which addresses some facets of the problem of scientific literacy, and the course of History of Science, which examines science as something changeable and in constant development, both take a collective approach to the construction of scientific knowledge.

The second discursive montage, on the other hand, sought to comprehend the method by which knowledge is constructed for instruction as well as the shifts in the participants' imaginations regarding the role of the teacher in the classroom and the qualities required for designing a "good class". Snippets of the undergraduates' responses to the topic from their graduation course and after it has ended are shown in Table 2 below.

Table 2 - Answers to the questions "What is the role of the teacher in the classroom and what characteristics should a class have to be considered a "good class?"

Students	Answers to the question
Caio	2014: *The teacher should be a learning facilitator [...]. A "good" class should be presented with a strong theoretical basis that explains the formulas and examples, exercises [...] an expository method, with videos or experiments that show the theory discussed.* 2015: *The teacher must be a facilitator of learning [...] identify failures and previous conceptions and work on them.* 2016: *Depends on the situation, at times the teacher should be the motivator of debates and discussions [...]. A "good" lesson should be clear, address different methods of explanation, and suit different contexts and students.* 2017: *The teacher must act as a knowledge mediator [...] bringing the content closer to student's daily lives.* Interview 2020: *So, what I saw as teaching was simply that teaching that we see in preparatory courses, that repetitive teaching, through lists of exercises, through phrases to memorise formulas, that 'showman' teacher who makes everyone laugh. [...] Today I see teaching much*

	more as a factor of thinking, of teaching scientific thinking. [...] you must be open to questions [...] you must have prepared what, perhaps, the student might think, how he can receive this information, even more so now in times of distance learning.
Sara	2014: *Active, that makes us question, interpret, that covers us, and that does well what it proposes*. 2015: *A great student-teacher relationship, examples, experiments, discussions.* 2016: *Provide tools for the student to learn certain subjects. Student-teacher interaction.* 2017: *A knowledge facilitator. [...] having more than one means of teaching and evaluating students, being a class where students can express themselves, question and discuss topics.* Interview 2020: *[...] We saw a lot about this in the internship, because we teach courses in regular education and in youth and adult education and it was practically the same content, but the methodology had to be completely different because they are different realities. [...] we must consider the space we are in, what we must work with, the time and the profile of the students.*
Lucio	2014: *Explain the content of your story.* 2015: *[...] demonstrate the content and answer questions when students have them.* 2016: *Explain the content in a clear way, solve the doubts of the students. A class that exposes the content in a simple and clear way, the student can relate the subject seen in the classroom with his daily life and be able to use it.* 2017: *Explain and involve the content taught to the student [...] for each class there must be a planning and many times it may not work out; in this planning she could use a didactic transposition.* Interview 2020: *[...] have mastery and always be studying, including current facts, to be able to transmit a "good" lesson related to this [...] check the context within your classroom, around the school and the city in which you are ministering. This is something we often see, mainly in methodologies [...] that survey previous conceptions. Then again, you should try to relate these conceptions to the historical parts, because they are often directly linked.*

In Sara and Caio's speeches, it is possible to spot the mobilisation of three teaching knowledges, from the perspective of Gauthier and collaborators (2013): those of the pedagogical tradition (these are the knowledge about the traditions that structure the school and teaching and are also related to social representations of the teaching profession).

The ones that are mobilised during the teacher's daily practises and are closely related to the habits that teachers develop during their professional activities and experience are those from the educational sciences (related to theoretical knowledge about education arising from teacher training). Sara and Caio both show signs of mobilising pedagogical tradition knowledge as the foundation for their discursive productions in the first year of the course.

Beginning in the second year of the course, the research elements related to the area of science teaching and discussed in the disciplines of the didactic-pedagogical knowledge formation axis are integrated into the discursive materiality about the role of the teacher in the classroom and the requirements for designing a "good" class, providing evidence of the mobilisation of knowledge from the education sciences.

In addition, Sara and Caio, in the last years of the course, use their conducting experiences both in the internship subjects, as is the case of Sara, and in teaching after completing the degree, as is the case of Caio, to base their discursive productions, suggesting the mobilisation of experiential knowledge.

Lucio, unlike the other undergraduates, gives evidence of the mobilisation of knowledge from the pedagogical tradition throughout his entire formative process by describing the role of the teacher in the classroom simply as "*explaining the content*". According to Gauthier et al. (2013), such a situation can be justified since pedagogical tradition knowledge is stronger than

one can imagine, and they will only be adapted and/or modified by experiential knowledge or, if applicable, validated by pedagogical action knowledge.

However, when reflecting on the characteristics of a "good" class, the participant presents in his discursive materiality, in the second half of the course, elements of research in education and science teaching studied in the courses of axis 2 of the curricular matrix, suggesting the mobilisation of knowledge of the sciences of education.

The third and final discursive montage sought to understand the participants' ideas about research in the teaching profession in 2020. The following question was used to accomplish this: Do primary school teachers conduct research as part of their professional practise? The clippings of the participants' responses on the subject are presented in Table 3 below.

Table 3 - Answers to the question "Do basic education teachers carry out research in their professional practice?"

Students	Answers to the question
Caio	*[...] Maybe not along the lines of a scientific research that will be evaluated perhaps in a different way, it is research yes, it is carried out. I believe that many professors, after spending years and years in their careers, fail to do this activity and their classes are the same every year [...] so, not that he wasn't doing research, maybe he was doing research, modifying some things that maybe he didn't like and what he really liked he kept applying.*
Sara	*Yes, every teacher conducts research. If we stop to think about it, the teacher will make a lesson plan based on the training he has, and then he will test it. He will try to improve. He will make a report, even if it is mental, about what was good, and he will be able to apply and modify it for his other classes.*
Lucio	*[...] What he is expected to do, obviously some do, is trying to see what the student knows (as I am very much in favour of trying to see the concepts), try to see his development, even using the forms of assessment. We can use the evaluations to see mistakes and try to improve our teaching.*

The discursive excerpts indicate that the three interviewees' imaginaries are inserted within the perspective of the teacher as a researcher of their own practise, that is, it considers that the teacher conducts research in the classroom to try to improve their future practise. Such an understanding is inserted in a model of teachers that reflect on the actions taken, which, according to Schön (1992) is a reflection on reflection in action, for the teacher investigates their main difficulties in the search for new actions to solve them.

This model, as discussed by Pimenta (2006), made several contributions to the field of teacher training, and favoured a wide field of research on the subject, including that on teacher professionalisation and the development of professional identity. However, as the body of research on the reflective model has grown, a few concerns about its limitations—particularly those related to practise-based reflection—have surfaced.

Because this teacher model does not consider the influences of the school reality in a comprehensive context interpellated by historicity and ideology, several researchers (Contreras 2006; Pimenta 2006) note that it can result in the conditioning of reflection to an individualistic and limiting exercise in the classroom.

From this angle, the imaginaries of Caio, Sara and Lucio, as seen through the eyes of the reflective teacher, have an impact on the way in which their identities are constructed. As argued by Nuñez and Ramalho (2005), teachers construct their professional identities from their representations of themselves and the group into which they are inserted.

Thus, the professional identity of a professor is socially constructed and materialised through a plurality of representations that professors make of themselves, the group to which they belong, and their functions. Accordingly, whether deliberately or unconsciously, markings resulting from its historicity, work production circumstances, and the social imaginary about the profession are established.

Final remarks

The findings indicate that the pedagogical project of the course and its curricular matrix play a critical role in transforming the conceptions of individuals graduating in Physics, in the process of constructing knowledge for teaching, and in the formation of the teaching identity.

As a result, we come to believe that it is also possible and practical that, during the initial training, the courses can provide to the prospective teachers and idea of research as a promoter, not only of reflection, but also of criticism, as facilitator of teaching practise.

To achieve this, we concur with Habermas (1987) that the dialectic between theory and practise is necessary in reflective moments. We do this by interpreting reflection critically, that is, as a dialogic process in which teachers engage with their peers in discussions about social and political realities of their own teaching action.

Therefore, we support the integration of academic instruction based on literature and a thorough understanding of teaching methods in initial teacher training. It is critical to empower teachers to develop critical thinking skills, which will allow them to shape their professional identity and challenge more traditional hierarchical systems. Individuals pursuing a career in education can cultivate a well-rounded understanding, strong analytical capabilities, and proficient communication skills by acknowledging the importance of embracing different points of view. This approach also promotes a culturally relevant and inclusive curriculum, assisting teachers in developing a stronger professional identity. Ultimately, we hope that initial teacher training programs enable future teachers to create learning experiences that address each student's unique needs, ensuring a sense of worth and assistance for all learners.

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References

Adorno WT (1996) ‘Teoria da semicultura’. *Educação & Sociedade*, Campinas, 17 (56), 388-411.

André M (2013) ‘Pesquisa, formação e prática docente’. In*:* M. André (Ed.). *O papel da pesquisa na formação e na prática dos professores* (pp. 55-69). Campinas: Papirus.

Carvalho SR (2016) *Teaching professionalization and subordination of educational work to the flexible logic of capitalist production.* 238 p. PhD Thesis (Doctorate in School Education) – School of Sciences and Letters, São Paulo State University, Araraquara, São Paulo, Brazil.

Contreras J (2006) *A autonomia de professores*. São Paulo: Cortez.

Flick U (2013) *Introdução à metodologia de pesquisa: um guia para iniciantes*. Porto Alegre: Penso.

Freire P (2020) *Pedagogia da autonomia: saberes necessários à prática educativa*. São Paulo: Paz e Terra.
Galamba A (2018) 'Teacher training in England'. In: British Council**.** *Education in England: Teacher training, teaching career and science teaching*, England: British Council.
Gauthier, C,. Martineau, S., Desbiens, J.F, Malo, A & Simard, D. (2013) *Por uma teoria da pedagogia: pesquisas contemporâneas sobre o saber docente*. Ijuí: Ed. Unijuí.
Giroux HA (1997) *Os professores como intelectuais: ruma a uma pedagogia crítica da aprendizagem.* Porto Alegre: Artes Médicas.
Habermas J (1987) *Teoria de la Acción Comunicativa*. Madrid: Taurus.
Lüdke M & Cruz GB (2005) 'Aproximando universidade e a escola de educação básica pela pesquisa'. *Cadernos de Pesquisa*, São Paulo, 35 (125), 81-109.
Mcintyre D (2005) 'Bridging the gap between research and practice', *Cambridge Journal of Education*, 35 (3), 357-382.
Nóvoa A (2007) 'Os professores e as histórias da sua vida'. In: Nóvoa, A. (Ed.). *Vida de Professores.* (pp. 14-30). Porto: Porto Editora.
Nuñez I & Ramalho B (2005) 'A pesquisa como recurso da formação e da construção de uma nova identidade docente: notas para uma discussão inicial', *EccoS – Revista Científica*, 7(1), 87-111.
Orlandi EP (2015) *Análise de Discurso: Princípios & Procedimentos*. Campinas: Pontes.
Pêcheux M (2002) *O discurso: estrutura ou acontecimento*. Campinas: Pontes.
Pimenta SG & Lima MSL (2010) *Estágio e Docência*. São Paulo: Cortez.
Pimenta SG (2006) 'Professor reflexivo: construindo uma crítica'. In*:* S. G. Pimenta & E. Ghedin (Eds.). *Professor reflexivo no Brasil: gênese e crítica de um conceito*. (pp. 17-52). São Paulo: Cortez.
Saviani D (2007) *História das ideias pedagógicas no Brasil*. São Paulo: Autores Associados.
Schön DA (1992) 'Formar professores como profissionais reflexivos'. In: A. Nóvoa (Ed.) *Os professores e sua formação* (pp. 77-91). Lisboa: Dom Quixote.
Veiga IPA (2008) 'Docência como atividade profissional'. In: I. P. A. Veiga & C. M. D'ávila (Eds.) *Profissão docente: novos sentidos, novas perspectivas* (pp. 13-21). Campinas: Papirus.