

Teaching in a professional master's: records of perceptions and practices in (re)construction

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ABSTRACT

The article presents the results of a survey conducted within a master's post-graduate program – professional mode – involving nine teachers responsible for both the subjects within the curriculum, and the guidelines for the final papers. The objective was to investigate the epistemological realities, skills, abilities and perspectives of teachers and offer conditions to (re) build a framework for making decisions regarding the curriculum, the plans, actions and evaluations toward the master's program's improvement, the teaching practice and student performance. The results indicate the teacher's commitment to education, with particular emphasis on the sharing approach between disciplines and areas of knowledge in research.

KEYWORDS

master's degree; teaching; learning.

DOCÊNCIA EM MESTRADO PROFISSIONAL: REGISTROS DE PERCEPÇÕES E PRÁTICAS EM (RE)CONSTRUÇÃO

RESUMO

O artigo apresenta os resultados de uma pesquisa realizada no interior de um programa de pós-graduação *stricto sensu* – modalidade mestrado profissional – envolvendo nove docentes responsáveis pelas disciplinas da estrutura curricular do mestrado e pelas orientações de trabalhos de conclusão. O objetivo foi investigar as realidades epistemológicas, as competências, as habilidades e as perspectivas desses professores e oferecer subsídios para (re)construir um referencial para a tomada de decisões referentes à organização curricular, planejamentos, ações e avaliações, na direção do aperfeiçoamento do programa, do exercício docente e do desempenho discente. Os resultados indicam comprometimento dos docentes com o ensino, com especial destaque para o compartilhamento de disciplinas e aproximação entre áreas do saber nas pesquisas.

PALAVRAS-CHAVE

mestrado profissional; docência; aprendizagem.

DOCENCIA EN MAESTRÍA PROFESIONAL: REGISTROS DE PERCEPCIONES Y PRÁCTICAS EN (RE)CONSTRUCCIÓN

RESUMEN

El artículo presenta los resultados de una encuesta llevada a cabo dentro de los estudios de postgrado *stricto sensu* –modalidad maestría profesional– involucrando nueve profesores responsables de las asignaturas de la estructura curricular del máster y de las orientaciones de trabajos de conclusión de curso. El objetivo fue investigar las realidades epistemológicas, las competencias, habilidades y perspectivas de esos docentes y ofrecer subsídios para (re)construir un referente para la toma de decisiones con respecto a la organización curricular, a planificaciones, a acciones y evaluaciones hacia el perfeccionamiento del programa, del ejercicio docente y del desempeño discente. Los resultados indican comprometimiento de los profesores con la enseñanza, con especial destaque al compartir de disciplinas y aproximación entre áreas del saber en la investigación.

PALABRAS CLAVE

maestría profesional; docencia; aprendizaje.

INTRODUCTION

Teaching in professional master's programs presents special challenges for professor's in the *Stricto Sensu* modality. Emphasis should be given to the quantitative and qualitative forms of scientific productivity, guidance in planning pedagogical activities and the writing of dissertations by master's candidates and to the need to develop individual technical productions or those based on the activities of an advisee or on other partnerships. Another issue is the relationship between teaching and research, since the final papers prepared by professional master's students should be an intervention in their pedagogical practice, which alters the predominant academic focus of graduate programs, especially those dedicated to teacher education. It is known that academic masters' programs prepare researchers, who usually enter doctoral programs, deepening their studies in a certain field of knowledge. These studies are often distant from classroom activities, which distances theory from practice. While in professional masters' programs there is pedagogical intervention, and research is closely linked to what is taught.

If we observe the pedagogical practices traditionally adopted in schools, we notice that they are still very far from the innovative ideas generated from research (Van Driel; Beijaard; Varloop, 2001). Researchers such as Pro, Valcárcel and Sánchez (2005) have investigated beginner teachers' perceptions of the possibility to apply or utilize results from investigations about teaching conducted during their early training period. The absence of this use has been attributed by teachers to the heterogeneity of student groups, a lack of interest in and motivation to study, and to the incipient practical and theoretical knowledge required for the development of investigative, scientifically consistent teaching.

Taber (2000) recognizes that few teachers perceive the relevance of research in teaching for modifying their practices and argues that teachers would benefit greatly if they could be more actively involved in educational research. Brazilian theoreticians such as André (2010); Santos (2010); Soares (1993), affirm the importance that teachers utilize research results, not only as a means of access, "but in the possibility that by living with research, and, furthermore, experiencing it, that teachers can learn and incorporate the knowledge production processes in their specific areas" (Soares, 1993, p. 114).

The gap between research and learning and the need to qualify professionals, have been the central reasons for the creation of professional master's programs, a modality that was officially created in Brazil through Rule 80/1998 with the purpose of educating master's who are qualified to perform public interest activities supported by scientific and technological knowledge, with an emphasis on technical applicability and operational flexibility. Normative Rule nr. 7 from June 23, 2009 (Brasil, 2009), which regulates the offering of those courses, ensures their validity and grants the holders of professional master's degrees the same rights as holders of academic master's degrees. The stated purposes of these degrees is to transfer knowledge to society and attend specific demands from various productive sectors.

Normative Rule nr. 17, published on December 28, 2009, ratified the principles and objectives in the earlier document, and confirmed the definition of a

professional master's program as a *Stricto Sensu* graduate modality that is responsible for training professionals who are qualified to perform advanced, innovative and transformative professional activities by incorporating the scientific method and performing technical scientific activities.

Article 3 of Normative Rule 17 highlights the possibility for professional master's programs to promote the continuous "incorporation and upgrading of science and technology advancements, as well as the qualification to apply them". This application focuses on "management, technical and scientific production in applied research and the proposal of innovations and technological enhancements to solve specific problems".

The competencies and skills required to teach in such courses or programs often constitute a significant change for professors, in contrast with the principles that guided their early training and even their continued training.

The purpose of the study that gave origin to this article was to investigate the epistemological realities, competencies, abilities and perspectives of professors in a professional master's program in science and mathematics education and to (re) construct a reference framework for making decisions about curricular organization, and the planning of teaching methodologies for learning and evaluation and actions of the faculty, aimed at enhancing the course, the teaching practice and student performance. The apparently endogenous character of the research is overcome by the possibility to contribute with discussions that can help strengthen the identity of professional master's programs, qualify science and mathematics teaching and bring teaching and research closer together, in an effective relationship between theory and practice, intellectual production and application in educational contexts.

The professional master's program that is the object of this study is part of a graduate program organized to educate master's in science education and is attended by teachers from various municipalities of Rio Grande do Sul and other Brazilian states. This geographical scope represents a commitment and a challenge to the professors and administrators to maintain effective compliance with the improvement of teaching in this field. "As recent studies and research in the area clearly show, teachers are essential professionals in society's changing processes" (Delizoicov; Angotti; Pernambuco, 2011, p. 11).

The research was initially based on the following question: What concepts, cultures, epistemologies, practices, and personal and professional knowledge support or present obstacles to the learning of teachers who are being educated? This question guided the investigative focus towards professors and students with the objective of building a broad, clarifying scenario and avoid biases and the predominance of subjectivity.

Given the broadness of the research, this article is dedicated to presenting the results obtained from professors, considering the information gathered during individual interviews. The analysis of that information acquires meaning and broadens the understanding of the findings considering the contexts, trajectories, conceptions and actions of the professors who were interviewed. It is from this perspective that the following segments present some considerations on the subject, initially explaining the path taken to construct the study.

INVESTIGATIVE TRAJECTORY: LEARNING ABOUT CONCEPTS AND PRACTICES

RESEARCH CHARACTERISTICS AND THE INDIVIDUALS INVOLVED

In its broadest purpose, the research sought a deep immersion into the education process of a professional master's program aimed at teacher education, and took on the contours of a case study (Yin, 2005), which offers the main advantage of studying people in their natural environment, exploring phenomena under several angles. Moreover, it allowed for direct observation of the elements that integrate the context and preserve the characteristics of real life events. Case studies use qualitative investigation strategies to map, describe and analyze the context, relations and perceptions of the situation, phenomenon or episode in question. They are also useful for generating knowledge about significant characteristics of experienced events, such as interventions and processes of change (Minayo, 2007).

As an investigative strategy, the study maintained as a methodological guide the suppositions of qualitative research (Triviños, 2001), whose epistemological position accepts that multiple realities are construed by the individual who knows. That individual incorporates the observations realized during the process, which acquires meaning and significance when studied within the context in which it occurs. The researcher is understood to be a part of the process, from whom reflexive, ethical and scientifically based attitudes are required.

Considering the focus of the study, the participating individuals were nine professors who teach in a professional master's program at a private institution of community character, two of whom were male, and seven female. Among the professors, five have bachelor's degrees in mathematics, one in languages, one in pedagogy, one in philosophy and one in chemistry. Three are doctors in education, one in philosophy, one in science education, one in chemistry and two in computing in education. All the professors also work in *Lato Sensu* graduate courses, and in undergraduate courses offered by the institute of higher education that offers the professional master's program being studied.

All the information was gathered through semi-structured interviews, which approached aspects related to the teaching conceptions and practices and which were organized around questions previously prepared by the research team that coordinated the investigation. The purpose of the interviews was to ensure that the study would gather pertinent information without limiting or restricting the expression of opinions. The interviews were recorded with the consent of interviewees, who granted their authorization by signing a free and informed consent form. The recordings were transcribed and submitted to final appreciation and approval by the participants.

The handling of the information followed the guidelines of discursive textual analysis (Moraes, 2003), which includes the deconstruction of the texts followed by their organization into units for analysis or units of meaning or significance. The units of analysis are presented in an interlacing between statements and the theoretical foundations that guide the study. The letter P (professor) was used to

indicate the individuals, thus ensuring that they would not be identified. Thus, the professors have been identified as P1; P2; P3; and so on.

The analyses cover the approaches proposed by the prepared questions, without limiting the interviewees' free manifestation, any complementary comments that arose during the process and the reflections required to analyze and understand the findings.

PROFESSIONAL PRACTICES OF PROFESSORS: EPISTEMOLOGIES AND KNOWLEDGE IN (RE)CONSTRUCTION

The professional practice of a professor is multifaceted and subject to countless interferences of a political, social, cultural and personal nature, and thus may be analyzed from different perspectives. Tardif and Lessard (2007) consider teaching to be socialized human work. The authors point out three dimensions for analysis: the activity, status and experience. Considering work as an activity, the authors mention two points to be considered, namely, the organizational framework where the activity is performed and which "condition it in several ways", and the exercise of the activity in relation to "the continuous interactions at the core of the concrete work process between the workers, their products, objectives, resources, knowledge, and the results of their work" (*idem*, p. 49).

Considering the activity, the essence of professional practice, it is important to make a special focus on the issue of a teacher's knowledge, which Tardif (2004, p. 63) identifies and classifies as "personal knowledge that originates from previous schooling, originating from training for teacher accreditation, originating from programs and didactic books used at work and that which originates from their own experience".

Without denying the importance of each source of knowledge according to its approximation with the issues being analyzed, we highlight the construction of knowledge in the education for teacher accreditation and which originates from experience itself.

As a result of a study conducted with teachers in elementary education, Lüdke and Cruz (2005) point out the weakness of teacher education in teacher accreditation courses, characterizing it as not very investigative and theoretically fragile. According to these authors, school teachers are not prepared during their university education to conduct research, investigation or to exercise professional autonomy.

Further criticism of teacher accreditation courses involve their fragmented curricula, excessive bureaucracy, the need for the teachers to perform unrelated tasks, lack of resources, adoption of labor management and organizational practices and standards that originate directly from the industrial and administrative environments (Tardif; Lessard, 2007). The authors understand that "historically, schools and teaching have been and still are invaded by models of management and labor execution that originate directly from the industrial context and from hegemonic economic organizations" (*idem*, p. 25).

How is this reality present in schools that prepare science and mathematics teachers? They most likely do not constitute islands in the Brazilian educational

context, however, it is important to question the space research has in that preparation and the development of the indispensable relation between theory and practice required by a professional master's program. As doctors in mathematics, physics, chemistry, biology, philosophy or education, the professors carry marks from their educations at the graduate and post-graduate levels.

The research undertaken in the *Stricto Sensu* graduate programs follows a traditional trend of carrying out research about teachers and teaching, but it is seldom conducted within a teaching process with the participation of teachers. In the work context in a professional master's program, the need arises to develop a proposal to teach about research and supported by research published in scientific articles.

How can this function be performed with the competence and innovation required by the advancements in science and technology? How can scientific procedures be incorporated and provide guidance for performing innovative and enterprising technical scientific activities in the educational context? The answers to these questions approximate Tardif's reasoning (2004, p. 57) that "if work changes workers and their identities, it also modifies, always over time, their 'knowing how to work'".

Tardif affirms that teachers learn to be teachers by performing their role, involving teaching in all its dimensions, constituting what the author calls the epistemology of the professional practice, defined as "the study of the set of knowledge actually used by the professionals in their daily work space to perform all their tasks" (*idem*, p. 255).

Thus, the epistemology that was traditionally understood along a direct line in the Kantian tradition, passing through positivism, after taking a long route "progressively shifts from the theory of knowledge to the theory of science, and more specifically the empirical sciences of nature" (*idem*, p. 254). This does not mean there is a total distancing, but the construction of a new look at the issue of knowledge by beginning to consider real scientific activity, gradually distancing itself from positivism. Karl Popper contributed to this discussion with the idea that "science is not a system of concepts, but a system of *statements*" (2007, p. 35), which he corroborates in the theory of falsifiability as the criteria for demarcation. Kuhn's concept of paradigms (2007) added to this vision, considering the social contexts that affect transformations, as well as the context of discoveries. Kuhn is highly critical of scientism that seeks more to train scientists to solve a certain activity than to be concerned with science itself. There is thus an urgent need to broaden the horizon of understanding, as Tardiff clarifies (2004, p. 255):

On the Francophone and continental European side, epistemology – which was long defined by Neo-Kantianism and by positivism – also freed itself from the strict study of scientific logic to incorporate among its concerns the history of sciences (Ganguilhem), psychology (Bachelard, Piaget), sociology and the anthropology of sciences (Latour), etc., not to mention more radical thinkers such as Derrida, Lyotard or Foucault, who would deeply question the autonomy of sciences and scientific reasoning in an effort to reveal their conviviality with

distinct forms of power. Since the 1960s it can be said that we have seen a withering of the traditional field of epistemology (the psychomathematical sciences) and its opening to different “epistemic objects”, especially the study of daily knowledge, common sense, language games and of the systems of action of which individual reality is made.

The object of this study is the epistemology of professional practice aligned with one of the lines of master’s research, which requires us to analyze the body of knowledge used by teachers when performing their tasks, leading us to face the epistemological realities of the subjects of the research, both in teaching the classes and in the supervision of final papers. It is thus deemed to be a privileged space of knowledge, in which research is taught and learned to support the task of teaching and learning sciences.

THE SPACE OF RESEARCH IN TEACHING IN A PROFESSIONAL MASTER’S PROGRAM

The professors who were interviewed are participants in studies linked to the science education program and to research groups certified by CNPq. They also have partnerships with researchers from other Brazilian and international universities. They work on university extension projects and pedagogical consulting, complying with a large portion of the program’s social commitment, and especially the *Stricto Sensu* modality. They believe, as does Demo (1999, p. 127), that “*research* constitutes the soul of academic life as a scientific and educational principle, that is, as a strategy to produce knowledge and promote citizenship. This is essential, irreplaceable to them”.

Research as a scientific and educational principle is highlighted by one of the participants, who affirmed that:

Teaching and research have a very close relationship. At times people do not perceive this or they do not give themselves the time to think and reflect about it. Also, the results from research and the work can be put to good use in teaching, which is fundamental. [...] teaching provides us support to do research, and research brings results that overlap with teaching (P8).

This professor also pointed out the need to integrate teaching and research, theory and practice: “I believe the research experience would be enriching to the practice, especially for written production, which is a problem we face as well as our students” (T8). Demo (1999, p. 129) emphasizes the importance of research in the relationship between theory and practice.

[...] research encompasses theory and practice, dignifying both equally, as long as it involves dialoging with reality. Each concrete research process may enhance theory or practice; it may be more interested in knowledge or intervention; it may insist upon form or policy. However, as a complete process, every theory must be confronted with practice, and every practice must return to theory.

One of the challenges that persists in universities and in this group of teachers is maintaining the inseparability between research, teaching and extension. This group of professors understands that research constitutes a foundation for teaching and extension activities, as it represents autonomous, original and contextualized knowledge on which professors support a large portion of their work in teaching and in pedagogical consulting. The first exercise in this research within the context of the professional master's program was to promote the integration of research groups interested in similar or complementary issues to deepen and extend the spaces for construction of knowledge that are required to work at the professional master's level. One interviewee explained that:

[...] last year we combined research projects and now the research I am coordinating is about methodologies for teaching the hard sciences. Within this study we have three focuses, three methodologies, technologies (which I coordinate); mathematical modeling, and the other research is about study situations (P1).

In that integrated form of planning and conducting investigative processes, one concern arises: the scientific productions sent for publication, which are made evident in the statement by the professor who mentioned that *"there is a great difficulty to publish articles, as there is a lot of production for few publications"* (P3). Another interviewee, referring specifically to studies sent by researchers, considers that *"there is a significantly high number of publications, but they have very low scores. There is an effort to broaden this scope of publications in more qualified journals"* (P5). This "low score" is a reference to the *Qualis* ranking of the journals in the field of education.

It is worth pointing out that the professors in the professional master's program are evaluated by CAPES in the programs to which they belong, in accordance with paragraph 1 of line IX in Article 7 of the Normative Rule which states:

The course faculty must be highly qualified as shown by the intellectual production that constitutes specific publications, whether artistic production or technical scientific production, or, further still, by renowned professional experience according to each case (Brazil, 2009, p. 31).

Furthermore, regarding productions, Moreira and Nardi (2009, p. 6) clarify that "without sacrificing a minimum of academic production, significant technical production is expected from professional masters". Both modalities of production bring to the professors a *"concern for quality, but an even higher concern with the quantity of publications"* (T5), because "the permanent faculty members should present on average, every year, in the three years of the triennial evaluation a minimum amount of technical productions and academic production" (Moreira; Nardi, 2009, p. 6). The shift between the technical and academic perspectives has been a challenge for the professors, especially in research that should maintain "a focus [...] on the application of knowledge, not on production" (*idem, ibidem*).

The application of knowledge consists in developing a teaching proposal, a pedagogical intervention based on research and put into practice in the classroom,

in a real situation that generates reflections about its pertinence to and possibility for contributing to teaching. This process is executed by the master's student and supervised by a professor, and according to the interviewees is a form of research-action that can be prolonged and improved in the professional exercise of the future master.

While supervising the final papers, the professors must ensure that the precepts of academic research are present and interwoven with the development of a pedagogical practice "*without influencing students too strongly, but challenging them to construct*" (P5). Moreover, there must be planning of the work in the master's student's field and context of activity, since the main objective is to qualify teaching in the time and place it occurs. In this perspective, it is relevant to understand what the professors in the program think about teaching and learning.

CONCEPTIONS ON TEACHING AND LEARNING

One of the most important issues in the study with the professors was to recognize their conceptions about teaching and learning and identify the factors that either favor or obstruct these processes. This was shared by P2 who stated: "*I think it is important that each person has their own conception of learning and teaching*". The knowledge acquired and the values (re)constructed by professors while teaching a professional masters' course constitute a significant contribution to the qualification of a graduate program. It is necessary to listen to and record what professors say about their experiences, and especially perceive any (re)signifying of the practice, as expressed in the statement of one professor:

[...] I have been changing a lot, I used to think that teaching was to arrive in class, work in the class, work on my subject, work with the contents, and the students would work and when they had finished the exercises, got them right, for me, they would know. With time, I saw that this is not quite how it is[...]. With this experience and through my studies, I began to realize that it is not like this, even if students do it and then think that they know, they think they know but don't. In fact I think that learning is much more complex. Students must be much more active and get much more involved, now, how I could evaluate, conceive, consider this, I don't know (P1).

This teacher's observation is shared by other colleagues and theoreticians, such as Pozo and Crespo (2009, p, 16) who point out as a problem in science teaching the fact that "they [students] know how to do things, but do not understand what they are doing".

Revealing a position that establishes narrow relations between teaching and learning, P2 expresses that

[...] I will state only what I think. For me, teaching is a professional activity that should be organized in such a way as to make learning possible in different dimensions, it requires theoretical knowledge, related skills and practices, it is a multidimensional function, and increasingly more demanding.

It seems complex to define the nature of the professional knowledge that supports teaching. The multidimensional role the interviewee mentions refers to the contemporary requirement of working with conceptual, procedural and behavioral contents (Coll; Martin, 2004; Pozo; Crespo, 2009; Zabala, 1999).

Coll and Martin (2004, p. 15) understand that “one of the most complex aspects in the school curriculum is the definition of the educational intentions in a sufficiently correct fashion to direct teachers’ practices” and Pozo and Crespo (2009, p. 27-28) when questioning science education, suggest while the conceptual contents aid in overcoming “the difficulties in comprehension”, the procedural contents may turn students into “participants, to the extent possible, in their own processes of building and appropriating knowledge” and that the attitudinal contents should provide an education based on “standards that regulate behaviors and, above all, more general values”.

In that sense, P9 affirmed that:

[...] teaching covers all forms, every step, every process, every path towards the education and preparation of the person – intellectual preparation. That is how I understand it. Learning is related to my effort to teach, attempting to teach, and the student learning, so, in my view that is it, the pursuit for teaching and attempting to have students learn. I believe that learning is to understand or try to understand, not only the content, but seeking to relate, knowing how to seek, I think that this is what learning is, not just memorizing, knowing the paths of how to seek knowledge.

The professors understand that effective, contextualized education should rely on the use of technological resources, which they indicate are learning tools. One professor interviewed affirmed:

[...] we have been researching this issue of the use of technologies since 2003, 2004 and have a well defined discourse, we have been discussing this together, thinking about where we may include technologies, where the technologies can make a difference (P1).

The “make a difference” refers to the issue of learning and to the concern with dynamic, participatory classes that can be a reference for the practices of the master’s students by inserting into this context the command and use of technology, integrating into their daily routine what Pozo (2002, p. 24) refers to when advocating the need to assimilate the new learning culture required by the “society of information, of multiple knowledge and continuous learning”. That position is confirmed in a statement by P4: *“I must make a leap in quality, I must do something better with the use of technologies”*, which confirms the researchers’ perception.

[...] firstly, only those who are predisposed to learn do so, if you come here for me to teach you, for example, the integrals, even if I “put on a great show” and you are not interested, if that does not catch your attention. [...] I think that to learn, the first thing is to want to learn (P4).

The desire to learn or, more specifically, the willingness to relate the existing structures with new materials is referred to by Moreira when explaining the aspects of Ausubel's theory, stating that

[...] this condition implies that, regardless of how potentially significant the material to be learned is, if the intention of the learner is to simply memorize it, arbitrarily and literally, both the learning process and its product will be mechanical (Moreira, 1999, p. 156).

Mechanical learning, as mentioned by the author, is considered by Ausubel as a type of learning with little interaction between the new and the existing concepts in the cognitive framework. The willingness of master's students to learn was considered as one of the factors that contribute to the process of innovative transformation of the teaching practice and the effectively constructed learning. However, doubt remains about the dimension of the existing concepts in the cognitive framework and the possibilities for real interactions with new materials. That concern is expressed by P1, who affirmed that “[...] *from my studies I began to perceive that even if students do [the activities] and then think that they know, that is not so, in fact I think that learning is much more complex*”.

Learning as an internal process requires some kind of manifestation to be observed and followed. P5 expresses the complexity of this process by stating that:

[...] learning is an internal process that happens with each individual; real learning also changes the way of thinking and acting, and that [cognitive] change that happens is what permits the person to make decisions about their personal and professional situations.

The professors who were interviewed pointed out different possibilities for perceiving whether students have actually learned and, beyond individual and group analyses, they point out that “*the accompaniment of learning takes place through observing students' activities and also their questions and answers to the proposed activities*” (P3).

In detailing the forms of accompanying the learning and the results that emerge, one highly relevant element arises: writing, especially the writing of academic texts, which according to the professors is one of the main obstacles to learning, mainly due to the close tie with reading, a habit that is practically absent from the students' personal and professional routines.

Linguistic, social, anthropological, epistemological and relational issues take their space for reflection in the study setting and in the dynamic of the inquiring movement of the participants. The analysis of the statements of the interviewees led to a grouping of the meanings that delineated the possibilities for identification of the factors that constitute obstacles to learning and those that favor it. In an inconclusive fashion, which is open to questioning, some findings of the research within this dimension are presented.

MARKS OF SCHOOL CULTURE, EPISTEMOLOGIES AND TECHNOLOGIES AS CHALLENGES TO TEACHING AND LEARNING

The concept of culture is basic to the understanding of shared meanings that arose from analyzing the information in the research because “there are multiple realities, as there are multiple ways of living and giving meaning to life” (Pérez Gómez, 1998, p. 59). The ways of living, coexisting and being educated as a person and a professional create subjective representations with deep roots that are reflected by the actions and the forms of understanding facts and phenomena.

According to Pérez Gómez (*idem*, p. 60), culture “is a living system in a permanent process of change as a consequence of the constant reinterpretation of the individuals and groups who live in it”. The author emphasizes that culture has a deterministic and simultaneously dynamic and changing character. The expectations mentioned by the professors are based on their perspective of change, since the conceptions of the master's students, who are elementary school teachers, indicated, at the beginning of the course, a trend towards a reproduction of spontaneous, and behaviorist didactic models.

It became evident that the “knowledge of teachers is their knowledge, and it is related to their person and their identity, their life experience and their professional history” (Tardif, 2004, p. 11) and this epistemological reality was the starting point for the work in the classes.

One main challenge that arose from this study was the absence of a reading habit and the belief that “*attending classes is enough, they do not have that conception that they must work very much outside [class]*” (P1). This school culture inevitably reflects on the written production which, as mentioned above, constituted and still constitutes a strong barrier to the preparation of the dissertation. The students have grammatical problems, use improper terms, write confusing sentences and lack command of a formal, academic language required at this level of education.

The participants also highlighted the lack of command of technology, which significantly compromised work in subjects that, by the nature of their proposal must necessarily involve these resources. P1 regrets this unexpected reality and recognizes that “*this [lack of command of technology] really shocked us, because we all imagined that they arrived with the ability to use technological tools and this is not the case, their education is still very traditional*”. P1 added that “*the technological tools they use are word processors and some Internet searching, but reports of any experience in the use of technology in teaching, no they had not used any*” (P1).

The obstacles to learning, especially the lack of a reading habit, were attributed to the limited time for studying, since most of the master's student's worked forty hours per week, mostly in the classroom. The excess workload is undeniably highly significant, and was the topic of debate and of a pursuit for pedagogical alternatives that would avoid compromising the learning and the quality of the course.

The establishment of an equilibrium in the work of teaching and counterpoints to the obstacles, are made possible by specific elements of the master's program. Because of their importance in the (de)constitution of the research individuals, according to the explicit and implicit information that emerged during the investigative process, we deem it relevant to present them in the following segment.

THE SPACES FOR CONSTRUCTION AND QUALIFICATION

One interesting aspect that was observed from the statements made in the interviews is the enthusiastic way the participants speak of their work. They mention that they feel good working and enjoy being professors at the institute of higher education and in the master's program. They expressed proposals for improving their teaching activities and a desire to reduce the administrative and bureaucratic activities to provide "more space" to discuss pedagogical issues. When discussing teachers involved in his study, Behrsin (2011, p. 76) also found that they work with pleasure and enjoy what they do. "Amongst many difficulties, bureaucratic difficulties, non-realized projects that bring frustration, there is something that drives them forward: they enjoy teaching, they want to produce".

The group of professors in this study expressed concern with and commitment towards improving the quality of the course, which can be seen in the words of P3: "I think we have a good group that currently thinks as a group and is focused on the master's, despite differences in education, thinking, and learning theories, it works as a group, with cooperation and caring".

The work of the group of professors, which acts as a team, was highlighted by P8 who made specific reference to the system of sharing classes adopted by the group. The interviewee stated that:

This way of working, not in an isolated fashion, not with one professor responsible for a class, I think is extremely important because the activities may be planned together and the master's program seems to be more cohesive. The idea of a group of professors, so much so that one colleague who teaches mentioned a few days ago that the students had said how all the professors talk in the same way, explain things the same way, I think that is important because it shows the cohesion of the group, the group must be close. It is a master's program, a master's program is not made of small pieces, I have the impression that a master's, it is a master's, and not a simple combination of subjects. I think that the way it is structured is extremely important in terms of curriculum.

The comments by P7, in addition to the important component of the interpersonal relationship, reveal a concern for the lack of a more critical positioning by the faculty regarding the program and colleagues.

And so I think that there is a good relationship among the colleagues, as I said they knew each other previously, but there is a lack of a greater critical positioning, of the group, the coordination, and other professors of taking a more critical position regarding the program and the colleagues. Many times, there is the perception that I would rather omit information than, perhaps, clash professionally with a colleague, and that to consolidate a program such barriers must be broken down, this is a challenge.

The good relationship and the shared action in the classes and supervision, according to the interviewee, is a highly favorable factor, but it could compromise

the rigor and qualification required by the evaluation carried out by CAPES/MEC, which P2 ratifies by stating that it is necessary to *“consolidate this course, give it more visibility, make it, consolidated I would say, to have a good approval rating from CAPES.*

In the sense of course qualification and consolidation of the program, the interviewees revealed a concern with the continuous professional improvement of the professors, which is also present in P2's manifestation:

The other professional project is to write more, write and publish more, this is a professional project and I think it is very important, and a third project I would propose is to attend a course abroad, some contact abroad to learn a bit more about what happens in the world.

An analysis of these positions allows identifying the team work, the sharing in the teaching activity in the classes, the concern with continuous education and self-criticism as factors that would improve performance and learning in the professional master's program, as well as the consolidation of the program that is the object of this study. Upon being informed of the manifestations by the students who took part in this research, the professors interviewed corroborated the statements that emphasized the factors that favor the well-being and learning in the course. Among the factors pointed out by the students are how they are welcomed by the institution, the administration and the faculty; the availability and flexibility of professors in supervising their work and the opportunities for exchanging experiences among the different groups.

A SUMMARY OF THE *LOCUS* AND THE RESEARCH FINDINGS

The professional masters program for the education of teachers, is a space for teaching in reconstruction par excellence. Based on the presumption that knowledge about the perceptions, practices, epistemologies and spaces of research and the use of technologies is the source and reference for decisions aimed at improving and consolidating the program, this paper presented a detailed study.

There are obstacles to be overcome and paths to be taken in defining the direction of the course, all of which must be thoroughly and critically analyzed. Thus, it is recognized that this study is incomplete and identifies the space for its continuity. Challenges must be met creatively and with an enterprising spirit; they must be clearly identified so that they are not simply avoided and become crystallized in a conservative and outdated culture.

Based on the scenario presented, an effort was made to insert in the curricular matrix of the master's in science education in the graduate program in science education the subject of research methodology, since the statements of the professors interviewed in this study revealed that one of the main difficulties students faced is the production of scientific texts. Moreover, the program decided to intensify the reading of scientific articles and theoretical references that would provide a foundation for the program's lines of research.

The professors who were interviewed indicated that they are aware of the dimension of their work and perceived the presence of certain obstacles, particularly those of a cultural, cognitive and economic nature. These obstacles represent a

counterpoint to the spaces for integration, interpersonal relationships and the willingness to know identified by the students and ratified by the professors who were interviewed, and cannot always be overcome by their teaching activities, even if collectively decided upon and shared.

The challenge to improve teaching in the sciences and mathematics is combined with the social commitment to contribute to the education of professionals who will work in different contexts, and concretize the objectives of a professional master's program. The interviewees questioned transmissive teaching forms, and identified with cognitivist/constructivist references, while expressing belief in the potential of their pedagogical intervention. They indicated that the questioning, problematization and discussion about the directions of the classes with the students is an important strategy for organizing the teaching. They also highlight the pertinent use of didactic resources and experimentation in laboratories as factors for interlinking theory and practice, although they warned about the indiscriminate use of technological resources motivated by non-critical, standardized trends.

It seems relevant to occupy the spaces opened up by the personal and relational dimension. However, it remains to be known if these spaces contemplate education at a graduate level from the perspective of a critical, scientific reflection and the autonomy of the teaching and learning processes. The study revealed that the sharing of classes, the approximation of distinct fields of knowledge in joint studies and teaching, and shared supervision of master's student's have been fundamental experiences in the consolidation of the professional master's program in question.

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