

TEACHERS KNOWLEDGE: PRACTICAL FOUNDATIONS IN TECHNICAL TEACHING

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Abstract: *This research was developed at the Amazonas Federal Institute, with agricultural science teachers in technical courses. Our objective was to gather the knowledge that guide the teaching practice, identifying what are the fundamentals knowledge's that were build trough experience, aiming to verify the existence of a pattern in the teaching practice of these teachers. From these findings we propose teaching principles in technical education. We used grounded theory methodology, with semi-structured interviews and participant observation as instruments for collecting data. Through the data analysis emerged the theory entitled: "technical education teachers: a product of experience" which has the following categories: Technical foundations, technique as practice, teacher's professionalism, financial dependency and specificities of technical teaching. We conclude that to be a teacher in technical education is to develop your teaching trough experience.*

Keywords: *teachers' knowledge; technical education teaching; grounded theory;*

1. Introduction

The effort to understand the process by which teachers develop their teaching knowledge has become the research object of many researches in Brazil, especially since the 90s, when authors like Tardif (2014) became known to the Brazilian public through translations. The(se) researches focus is mainly on teachers: their opinions, representations, knowledge and practice. The "teachers' knowledge: practical foundation in technical teaching" research objective was to gather the knowledge that guide teaching practice in the technical course of agricultural sciences in the Amazonas Federal Institute, in the east area of Manaus. This institution has 78 years of experience in agricultural teaching. It was necessary to identify the practical knowledge and verify the existence of a teaching pattern that conducts the technical teaching.

The professional teaching in Brazil can occur simultaneously with High School, so the students graduate high school with a professional qualification. The teachers of the common high school curriculum, mandatorily, have had teachers training. They study to be teachers. However, in the technical courses teachers have bachelor's degree and weren't trained to become teachers.

This research focus in the development of the professional activity of the bachelors teaching. We aim to contribute so these teachers' knowledge can be translated into an organized and sharable content. We agree with Tardif (2014) when he states that teachers are the subjects of knowledge, that they should dispose themselves to name, objectify and share their teaching practice.

2. Theoretical framework

We have invested in the appropriation of the teaching knowledge, in the definition of an assumed concept for Pedagogy and Didactics, in the pedagogy of Professional and Technological Education (EPT) and in the teaching of technical education, recognizing that

the latter two do not represent consolidated research areas, however, we have noticed that the literature already points to possible referrals.

We understand that teachers teaching knowledge comes from the work experience of teachers and it only makes sense if put into practice. That is, the teacher, its practice and its knowledge are inseparable, and they change through time. The teachers are producers of knowledge in a broad sense, of knowledge, skills, abilities and attitudes (TARDIF, 2014).

Besides, Libaneo (1994) defines didactic as the theory of teaching, one of the pedagogical disciplines that, as such, covers the discussions on objectives, content, means and conditions of the teaching process. On the other hand, general discussions form the theoretical *corpus* of pedagogy.

When discussing a possible pedagogy of professional and technological education we find the work of many Brazilian researchers, like Ramos (2008) and Ramos, Ciavatta and Frigotto (2010), among many others that point as a founding conception a proposal of a training that is polytechnic, unrestricted and unifying the human and technical dimensions of man. In this sense, the work is seen as an educative principle and the research as a pedagogical principle, aiming an integrative formation of the dimensions of work, science and culture.

On this perspective, Ramos (2002) argues that a professional education based on this model depoliticizes the workers by focusing on individual and technical elements at the expense of the public and political ones. And, especially it lowers the development of knowledge into learning activities and behaviors.

Barato (2002) presents a concept of the specificity of technical knowledge, rejecting that the technical knowledge represents an application of scientific knowledge. On the contrary, according to him, the technical knowledge represents a distinctive way of knowing reality. Supported by Merrill (1994) studies, Barato argues for the necessity of a didactical treatment appropriated to the technical knowledge.

According to Merrill (1994), depending on the operations used to process reality, distinctive knowledges are generated: factual, categorical, of principles and processual.

So, according to Barato (2002) the processual knowledge would be the object of the technical understanding, because it develops through a process that leads to a desired ending. That is exactly why, because it is processed differently, that the technical understanding requires an appropriated teaching treatment. The traditional teaching serves the teaching of categories, facts and principles, but it doesn't handle the knowledge related to processes.

3. Methodology

Facing the objectives and the theoretical framework we presented, we have used in this research the qualitative research, which turned up to be adequate, because, as Flick (2009) puts it, one of its main characteristics is the acceptance of the interaction between researcher and research.

In this sense, in an effort of identifying the teachers' knowledge it seemed to us methodologically adequate to use Grounded theory, because we needed to look for evidences in the teaching practice in technical education that could be systematized in a theorized discourse on reality.

According to Strauss and Corbin (2008), grounded theory is conducted by the use of analytical tools that make the theory emerge from the interaction and confluence between the data collection, the analysis and the wording of the collected data. This way, the processes the researcher uses to make the research advance from

an initial describing level which happens in the open codification of the collected data in the interviews, to a more conceptual level in the axial codification. Later, it reaches an analytical level in the selective codification.

This way of describing grounded theory is didactic, because the different processes of codification aren't consecutive. They happen simultaneously in many moments throughout the research. In the data collection we have used the semi-structured interview, that according to Flick (2009) aims to explicit the "complex supply of knowledge on a subject" that the interviewers have. We also used participant observation in order to complement and validate the data. Tardif (2014) affirms that we shouldn't trust what is said by the subjects on their knowledge, because usually they are unaware of how much they know.

Under Flicks suggestions we didn't make a rigid sample on Grounded Theory, but we defined that the subjects would be teachers with a bachelor's degree, in the agricultural sciences area in technical education. And they should have approximately 5 years of experience in teaching technical courses. Six teachers participated, ranging from 5-29 years of experience. All the teachers teach in courses related to agricultural sciences in the Federal Institute of Amazonas, in the east zone campus in Manaus.

The analysis was conducted through the codification line by line in order to find raw codes. We have also used physical diagrams to compare the properties and code dimensions found and the emerge of sub-categories, through the hierarchization of sub-categories, the reordering of hierarchies, the codes and sub-categories formulation, digital diagrams, that allowed the visualization of many analytical categories and its ramifications in order to find the central category. This kind of research is ideal in investigative contexts in which theories aren't available to explain or understand the process. Beyond that, the main characteristic of this kind of study is building a research result that contains: a main phenomenon, causal condition, strategies, condition, context and consequences. (CRESWELL, 2014). But the conclusions that this method gets don't refer to theoretical schemes of broad application, that are highly abstract, called formal theories, they are:

A group of well-developed categories, such as themes and concepts that are systematically inter related through declaration of relation in order to form a theoretical structure that explains some social relevant phenomena, psychological, educational, health-related and others. The declarations of relation explain who, what, when, where, how and with who the circumstances of a fact occur. [...] A theory is usually more than a sum of results; it offers an explanation on the phenomena. (CORBIN; STRAUSS, 2008)

Grounded theory is restricted to specific areas and ordinary phenomenon. However, this doesn't invalidate the importance of the results that can be found to explain, for instance, an educative phenomenon. We also have noticed that, in areas of knowledge that lack explanatory schemes, grounded theory is fruitful. The knowledge of teaching practice in technical education is an under explored theme, and so we ascertain the importance of this method in professional education.

4. Discussion

The need of mastering the knowledge of professional action is comprehended by teachers as necessary, so students don't learn mechanically the techniques, but this way they comprehend the scientific fundamentals behind the technique. In this research it became evident that the condition for scientific justification of the technique influences directly the educational actions. The educational actions, in this case, present themselves strongly connected to the idea of technique as practice. Technique as practice represents how the

teacher organizes the teaching situations of the technique. They are organized under four approaches: the discursive domains of the technique, the executive domain of the technique, the executive teaching strategies and the planning criteria. In order to develop the discursive domain of the technique teachers appeal to the organization of technical execution in stages, they use guidelines and mentor students on learning the stages of the technique. They recognize that talking about the technique doesn't mean mastering its execution. They teach technique rigor in using data and the technical language, they teach students to systemize their observations on technique through reports.

Using grounded theory, we were able to verify that through continuous learning and teaching experience, as well as the challenges faced, teachers develop the sense of being teachers and see themselves as teachers.

A crucial factor in technical education is the financial dependency on educational practices, the technical knowledge is only fully achieved through the opportunities of practical activities in which the techniques are applied. These activities require financial resources, mainly to the acquisition of raw materials. The unavailability of resources drastically reduces the students' practical experiences.

The conditions, actions, context and troubles have consequences that indicated the specificities of teaching in technical education: the intense interaction caused by the practical classes dynamics requires a leader position from the teacher. The unpredictability and vulnerability are experienced daily in practical classes, plus, technical visits happen in environments in which the teacher doesn't have much control. Besides, the teaching experience leads teachers to have opinions on the necessity of a teaching formation focused on technical teaching based on experiences.

5. Results

The scientific justification of technic acts as an assumed condition in teaching technical education. The technique as practice represents the teaching action of technical knowledge education. The professionalized teacher is characterized in the context in which the teacher without teacher training deals in developing its own teacher's identity. The financial dependency is a problem in developing technical education. The specifications of teaching technical courses are the contributions that come as a result of assumed conceptions and off the teaching experience in technical education, which differs from the academic education and from the professional education.

6. Conclusions

The strength of the experiences developed in teaching works as a triggering element of all its conception and teaching practice in technical education. This way, we can affirm that to be a teacher in technical education is to develop your teaching based on experience. This sentence is not exclusive of technical education teachers, but it is common to all teachers. However, the experience becomes almost an exclusive element for these teachers, because the lack of theoretical teaching references, the lack of operational models and training resources directed at them forces them to develop their teaching skills from nearly nothing.

We have found 46 occurrences of explicit affirmations, examples or advices that point out to the idea of experience. Also, implicitly, the narrative style adopted by the subjects always indicated the experience. Finally, the subjects demonstrated to give a lot of importance to experience as a formative element in technical education teaching.

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