

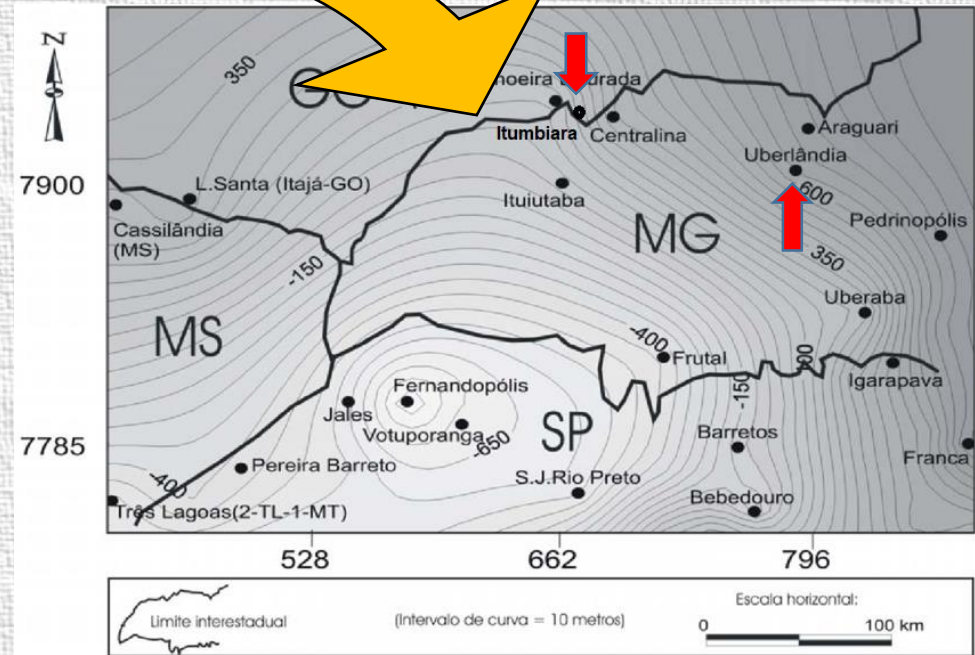


STOICHIOMETRY TEACHING: HIGHLIGHTING METHODS OF REASONING TO IN-SERVICE TEACHERS TRAINING



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Where are we?



Why In-service Teachers Training?



Personal History

- Love for education
- Professional performance

Initial formation

- Problems in Brazilian official documents guiding the purposes of teacher education
- decline in the number of students and pre-service teachers

Concern about the teaching performance

- Zeichner (1993) - learn to teach
- Falsarella (2004) – most proposals do not meet the needs of teachers.



Why Stoichiometry?

Interview and questionnaire with chemistry teachers.

We detected the difficulties inherent to content, and the lack of research and its approach in service teacher training.

Aim: pourpouse a course based on Science History and Vergnaud's Conceptual Field Theory.



Science History

- Science History stands out for the versatility it offers for the discussion and reflection of the natural phenomena, origin and transformations of concepts and also in the construction / reconstruction of knowledge. Its relevance in teacher training is also pointed out, since the knowledge of the subject to be taught by the teacher must be historically subsidized (BELTRAN; SAITO; TRINDADE, 2014).

Vergnaud's Conceptual Field Theory

- According to Vergnaud, conceptualization is the central problem of the process of knowledge acquisition. The author believes that the essential factor of students' difficulty in solving problems is closely related to "operations of thought". Thus, the mastery of a conceptual field does not occur rapidly, but progressively, from different situations and the formation of schemes to overcome the conceptual difficulties faced by students.

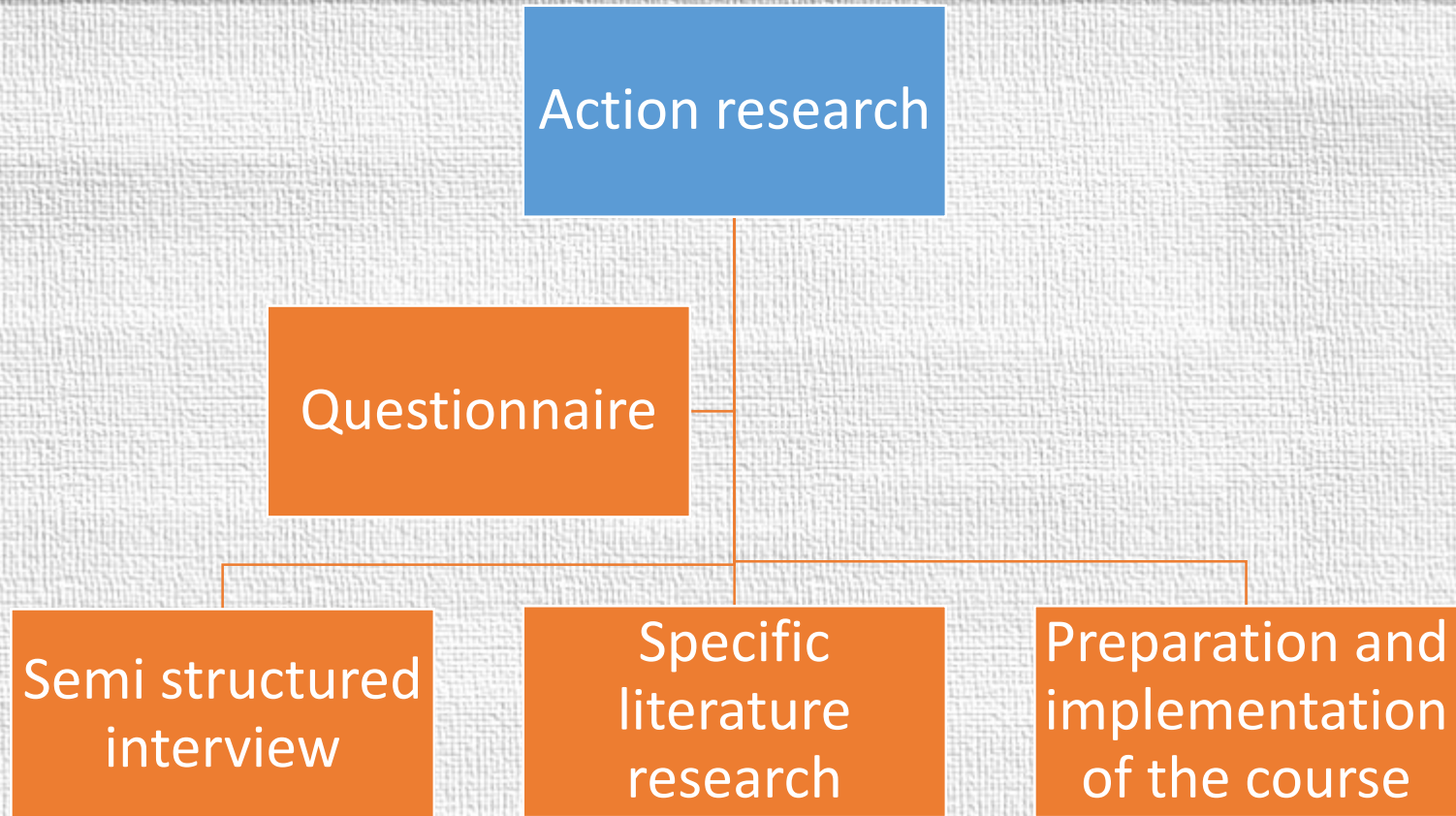


Goals

To structure and implement a course to in service Chemistry teachers from Itumbiara/GO, which provide us an activity manual, adapted from different sources, as an instructional material to the teacher.



Methods

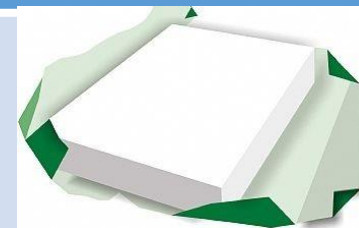


Activity

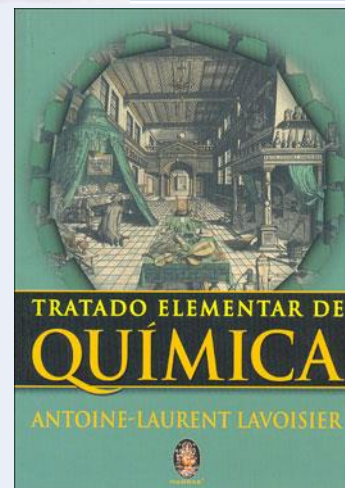
How many grains are in the pot of beans? What is the mass of a sheet of A4 paper?



Situation



We studied Chapter 9 of Lavoisier's book "Elementary Treated of Chemistry."



Experimental procedure: **Determination of purity degree of commercial caustic soda by titration and normality calculation.**

Teachers must execute a sequence of activities to implement calculations and report the results.

Challenge: **Prepare the sandwiches.**



Activities on chemical transformations and representation.

1: The students will receive a card with adapted activities on the chemical transformations, starting with a discussion about the circular representations created by Dalton in comparison to the Lavoisier's one and to the present one.

2: Dalton's ideas on the composition of matter.

3: Forms of representation of substances and rearrangement of atoms

We studied a translation of chapter 4 (sessions 1,2 and 3) of the Book of John Dalton

Situation: Directed study of the translation of chapter 4 (sections 1, 2 and 3) of the Book of John Dalton "New System of Chemical Philosophy", Comparative analysis of units and physical quantities.



Analysis of the Chemistry textbooks about the content of Stoichiometry.

Situation: Analysis of the specific chapter inside Chemistry textbooks, evaluated by Brazilian Didactical Book Program about the presentation and content of Stoichiometry.

Proust Law.

Situation: Proportional ratio between reagents and products masses in a chemical transformation.

Mass, matter quantity and number of particles.

Situation: Avogadro's synthesis – the mol definition (mol).



Experiment "The electrical conductivity in different materials.

Situation 1: Conductor or insulation rating.
Situation 2: Faraday's contributions and imagination about microscopic world; fundamental concepts in Electrochemistry

Reaction yield.

Situation: Weight ratio between reagents and products: predictions and yield of chemical processes.

Experiment "Heat released in reaction".

Situation: Stoichiometric relations between reagents and products masses and the amount of heat released or absorbed in the chemical transformations.



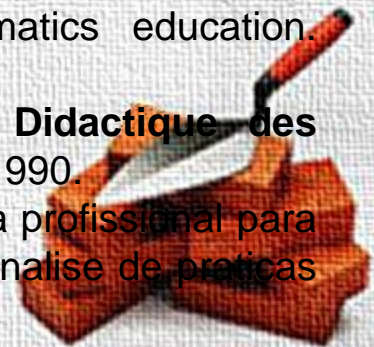
Results

- ❖ pleasure in solving challenges;
- ❖ interaction provides productive groups;
- ❖ the same situation can be realized as different forms of reasoning.
- ❖ Scaring of the unknown;
- ❖ discrepancy between the operative form of knowledge and the predicative one;
- ❖ difference between the teacher's speech and what he writes.



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Thank you!