“DO YOU THINK THIS IS REALLY TRUE?”
— DEALING WITH INVESTIGATIVE WORK IN MATHS CLASS

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— “the students explore an open situation, look for regularities, formulate and test conjectures, argue and communicate their conclusions orally or in writing” (DEB, 2001, p. 58).
— expressions of a non-routine work, referring to complex mathematical processes and involving strongly problematic activity (Martins, Maia, Menino, Rocha & Pires, 2002).
— a divergent activity that encourages someone to be curious, to search for alternative strategies, to consider what would happen if certain conditions changed or to generalize the situation (Chamoso & Rawson, 2001; Ponte et al., 1998).
— teacher’s leading role in classroom management, using a systematic inquiry, challenging the students, to deepen their explorations allowing the formulation of conjectures and following the practice of argumentation (Boavida, 2005; NCTM, 1991).

The study
(Pires, 2011)

Mathematics investigations

The task

Phases of the class

Conducting the class

Preparing the class

Goals
(i) to explore and investigate regularities in numeric sequences;
(ii) to analyze the relations between the terms of a sequence and indicate a rule, using natural and symbolic language;
(iii) to describe and explain strategies and mathematical procedures orally and in writing;
(iv) to use mathematical language to express ideas with precision;
(v) to argue and discuss the others’ arguments.

Evidences
— presentation of the task
 — I was clear in the presentation, knowing however that I could not be very objective because it is an investigation (...). I did not want to constrain the paths to be followed by students.
 — global attitude: paying much attention to the students’ opinions and productions. thinking over the suggestions, no immediate answers, returning the question...
 — formulation, validation and discussion of conjectures
 — Do you think the statement is true?... the rule works with these values, but have you already confirmed if it always works?... don’t know if it is always like that... you’d better confirm... Are you saying what you’ve just written?
 — clarification and consolidation of the mathematical concepts and procedures; systematization of mathematical knowledge
 — More the student has the opportunity to reflect on a subject, taking, writing or representing, the more he can understand it

Evidences
— search for and anticipation of the conjectures the students could formulate
 — And if a student follows a path that I do not understand?... And if I ask or accept an incorrect conclusion?... And if I am faced with a situation that I do not know how to answer?
 — ways of monitoring the students’ work, focusing on formative assessment
 — (...) to check whether or not the pairs understand the task, separating it again if necessary to encourage students to write down, in an explicit way, all the relationships they find and ask the students to test and confirm their conjectures and even reformulate them...

Evidences
— relevance of investigations in the teacher practice and in the curriculum development
 — What have really I learned... the connection between the investigations and the topics (…) and other curriculum themes.
 — relevance of investigations in the approach of the mathematical topics, although predicting some trouble in time management for the task
 — improvement of students’ learning as investigations allow personal processes based on their previous knowledge and more meaningful
 — All students were highly interested. (...) even the weaker ones were able to discover relations (…) so they developed a more positive attitude to mathematics.
 — Most of the students could build mathematical knowledge in a meaningful way. (…) I think that the most stimulating discovery bases, in which the student has a more active role allow to build a more meaningful mathematical learning. Solving the task has given students the opportunity to explain, discuss and test conjectures. The ability to say what they wish and to understand what they listen to must be one of the results of good mathematical learning (and teaching).
 — integration of investigations in teaching practices was enhanced by the training program experience, by the opportunity to work in more collaborative contexts oriented to discussion and collective reflection and to direct and continuous support in the classroom

Goal: to know how teachers integrate investigations in the curriculum and how they reflect upon their teaching practices.
— a teaching experience, developed in the context of a Mathematics in-service teacher education program (PFCM) and focused on the whole teaching cycle of an experienced Mathematics teacher in a 5th grade class of 25 students.
— a qualitative and interpretative approach (Bogdan & Biklen, 1994; Bolivar, Domingo & Fernández, 2001).
— data collection: transcriptions of episodes (training sessions; classroom), teacher’s written productions, students’ written productions while solving the tasks, and field notes (classroom; reflection sessions).
— data analysis supported by a floating approach and followed by a systematization, setting up classifications and categories, involving negotiation of meanings with the participants.