

TEACHING-LEARNING SEQUENCES TOOLS FOR LEARNING AND/OR RESEARCH

MARTINE MÉHEUT

Créteil IUFM and LDSP-Paris 7 University, France

ABSTRACT

What can contribute to the 'value' of a piece of research about an innovative teaching-learning sequence from a research point of view and a teacher's point of view? We will try to demonstrate that such values from these two perspectives are different, but not contradictory, and that they can be sought in the same research work. Two aspects will be developed and illustrated.

The first aspect is about '*a priori*' justification. We will propose a general framework which can help to make the principles underlying the design of a sequence clear, and so situate various teaching-learning sequences concerning the same domain of knowledge. Such a framework can be useful both for researchers to make their choices and hypotheses more explicit and for teachers to select one approach over another.

The second aspect is about '*a posteriori*' or 'empirical' validation. Referring to various pieces of research work, we will discuss the limits of usual 'comparative' approaches and will focus on more 'internal', 'descriptive' approaches. We will argue that describing cognitive pathways of learners through teaching-learning situations constitutes a fruitful tool, both for researchers to validate some of the choices or hypotheses underlying the design of the learning situations and for teachers to feel more comfortable with such innovative teaching-learning sequences.

1. INTRODUCTION

Coming back to the seventies and the early eighties, we can remember the importance of research about students' (mis)conceptions and spontaneous, common ways of reasoning. A question then arose: how to take into account such pieces of information for teaching? Trying to give answers to this important question, many teaching-learning sequences (TLS) have been developed and experimented with in classrooms.

Is it now possible to identify general frameworks which could be used by researchers to develop such sequences?

What are we doing when experimenting with such sequences? What kinds of results can we seek?

These are two questions I would like to discuss now in light of numerous pieces of research work which were developed over a period of about twenty years. These

questions formed the subjects of an International Symposium in Paris (Méheut & Psillos, 2000) and of a workshop during the ESERA Conference in Thessaloniki (Psillos & Méheut, 2001). During these meetings contributions were presented and discussed which have been published in a special issue of the International Journal of Science Education .

2. SOME APPROACHES IN DESIGNING TEACHING-LEARNING SEQUENCES

In order to characterize various approaches, let us start with a very simple model of teaching-learning situations. This first model (Figure 1) implies four components: teacher, learners, material world, and knowledge to be developed.

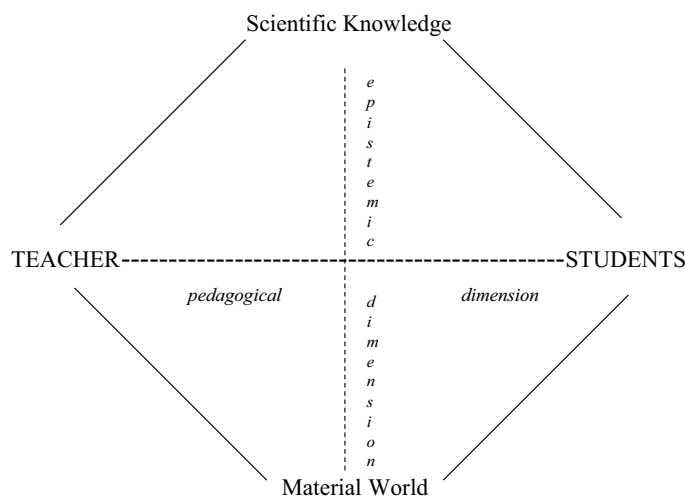


Figure 1. A « didactical rhombus » to describe the design of a TLS

This pictorial representation allows us to organize various considerations we can put into play when designing a TLS. The vertical axis represents an epistemic dimension, i.e. how knowledge works with respect to the material world. Along this axis, we can find assumptions about scientific methods, processes of elaboration, and validation of scientific knowledge. The horizontal axis represents the pedagogical dimension. We find along this axis choices about a teacher's role, types of interactions between teacher and students, and close to the vertex "students", we can place what is expected about interactions among students. Using this framework, we can characterize two prototypical approaches in designing teaching-learning sequences.