Chapter 7

Methodological Proposals for Simulation Games: The Transcoding Pattern[1]

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ABSTRACT

This chapter introduces the transcoding pattern, used in simulation games, to organize the language, the setting and the learning environment, defining the course of learning on various levels of abstraction. The aim is to facilitate the construction of a language that can be used in the processes of the mathematicization of reality and in math teaching in general. In order to give the reader a better understanding of the ideas and components of this process, an example of the transcoding pattern is provided before going on to describe the objective of our research the simulation game.

INTRODUCTION

In schools motivation to learn how to learn mathematics can be encouraged by an approach that orientates communication in such a way that it takes account of the real possibilities of children's abstraction, and teacher awareness of the meaning that children attribute to the words they use.

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Mathematical learning requires continual transition from experiential and informal codes used by children, to codes based on symbolic representations characterised by growing levels of abstraction and means of representation that become increasingly formal and complex.

From this perspective the design and realisation of learning environments can become a key element for the teaching of mathematics regardless of the different keys of interpretation that mathematicians, educational psychologists, educational experts, primary and secondary school maths teachers attribute to the learning process on the basis of theories developed within their respective disciplines, or with respect to the consolidated praxis used as a methodology.

Each discipline, in its turn, refers to a language characterised by a specific repertoire that requires an equally specific access code; it is difficult to organise the teaching of mathematics in a corpus starting from the ability to master different languages (at least, those of general teaching theory, educational psychology, science teaching and so on) that would allow us to organise learning environments on the basis of the specific and general learning needs of children, teaching strategies and the specific nature of arithmetical and geometric language.

In fact, mathematics continues to spread panic[2]; the number of mathematicians is declining and awareness of the educational value of mathematical learning is not very widespread. Here are, therefore, certain question marks underpinning our approach to the teaching of mathematics in primary schools:

1. How to introduce interface codes that are part of the process of stimulation, re-enforcement and organisational capacity of learning in order to tackle mathematical language when the conditions are developed for a dynamic and coherent process of abstraction and formal representation of concepts?
2. Can we accept *substantial rigour* of the language to be utilised in order to create the conditions in which motivation arises and maintain motivation when the complexity of formal mathematical language increases?
3. Which learning strategies can be stimulated in order to develop the construction of mathematical language in such a way that the necessarily less formal linguistic approach does not get in the way of understanding the concepts or introduce distortions in the use of a language (i.e., mathematical language) that does not allow for individualistic modifications?
4. Can we assume responsibility for the construction of a borderland between mathematical language and the meta-language that interprets the basic concepts in a way that is accessible to children?
5. Can we accept, for the time being, less *formal rigour*, monitored so that it does not prejudice the understanding of concepts and the future application of the rules and procedures of mathematical language?