

Chapter 2

Towards the Construction of a System of Maths Teaching

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ABSTRACT

The chapter sets out to identify the interpretive and structural criteria for educational innovation in order to find the necessary elements on which to plan the transformation (or to confirm the use) of instruments, means, technologies, learning models and schemata for the teaching of mathematics.

“Guy Brousseau was the universally recognised inventor of what is today recognised as mathematics didactics but, at the dawn back in the 1960s, it was only a mixture of clever intuitions, creation of ingenious and unstable devices, suggestions on the ways and contents often based on vague and wayward ideas.” -Bruno D’Amore (2008)

INTRODUCTION

The defining of a system of mathematics teaching springs from the need that, in a classroom situation, each and every learner ought to be in a position to gain maxi-

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mum prophet from an experience designed and realised to match the pupil's level and background knowledge and the special characteristics of the subject. To put it another way, the need for interaction between the pupil and the suitable learning environment (Glaser, 1977). The concept of adaptation represents a key aspect in the learning process. A learning environment that is able to adapt changes socio-cultural conditions outside the school is certainly preferable to one that does not take into account the needs of the pupils attending the school. It is necessary, therefore, to identify the exact conditions that will foster the needs of all the pupils on the basis of their potential. The quality criteria for teaching decisions are based on an awareness of the pupils' abilities and the conditions that encourage the growth of internal processes in order to support, increase and stabilise acquisition (Fontana, 1996). As a point of departure, the educational setting must be adapted to the actual situation on the ground to guarantee an increase in knowledge acquisition. Teaching provision, therefore, assumes various guises, and the elements that define a given educational environment are the "learning devices" (Calvani, 1995); these make use of different types of artefacts, cultural and organisational contexts: multimedia systems, museums, libraries, laboratories, organised games... Simulation games!

Perhaps, the least familiar aspect of all this discourse... on how to adapt the educational environment is the planning of cadenced times that leave room for experiences that render the process of learning fun. For teachers this commitment constitutes a necessary source of professional stimulus for the creation, projection and realisation of the times and spaces for learning that can be translated into group activities involving reciprocal exchange and hetero-control as well as direct guidance towards a desired goal.

In brief, mathematics teaching requires the ability to invent and experiment learning systems both in terms of educational psychology and methodology. At different times in the process of checking acquisition there is a need to activate strategies that can structure the forms and directions in order to bring out background knowledge and forms of thought on which mathematical learning is based. These, then, should act as a support for the development of the ability to connect the various concepts, rules, algorithms and solving procedures. The growing mastery that pupils acquire can guide the long process that requires, among other skills, the ability to:

- cope with ever more complex tasks;
- monitor learning in order to consolidate the underlying processes;
- incentivate self-evaluation through individual and group feedback;
- personalise the mode of intervention by integrating cognition, affect and emotion.

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