Chapter 8
Design of a Simulation Game for the Learning of Mathematics

Angela Piu
University of L'Aquila, Italy

ABSTRACT

This chapter provides the theoretical and methodological background for the design of simulation games; within this context attention will be focused on the teaching model and the characteristics of the games that have been used in the research. Although aware of the fact that the process of acquiring mathematical knowledge is both complex and non linear, we present the guided stages of the work, in each of which we shall describe the teaching materials employed to help further the didactic aims.

INTRODUCTION

Planning a simulation game for the learning of mathematics in primary school can mean preparing an accurate representation or model of reality[1], presenting a problem situation, in which children can activate a process of discovery, guided by concepts, rules or mathematical structures. Interaction with the model takes place when players act out roles that require coherent behaviour within the context of the game played according to the rules.

DOI: 10.4018/978-1-60566-930-4.ch008

It is clear that, for the simulation game to achieve its learning and social aims, it must be tailored to the needs and level of the players. The various parts of the simulation, moreover, must remain within the logic and procedures of the game, and coherent with the learning aims and the psychological and educational theories (Ballanti, 1988) that supply the background.

The planning of simulation games is a complex task: to invent and produce a simulation game requires skills in syllabus planning in the mathematical field combined with the creativity necessary to ensure that the game is enjoyable, absorbing and instructive for the participants. Experience, moreover, plays an important role along with the knowledge of the main learning stages, the characteristics of the learners, and the practical skills required to ensure the game proceeds in the right direction.

Various skills play an essential role in creating a game and as it is difficult to find them all in just one person, the answer is to build a project team, with each member able to contribute their own expertise, their own creativity, their own knowledge and work together. Anyway, there is another good reason to set up a team: there is no single method on which to base simulation games for the teaching of mathematics, nor universally accepted guidelines on how to go about it.

Notwithstanding, the various situations and contests of possible learning, the multitude of characteristics of the participants of the game and the variety of contents that one can decide to explore in the simulation, it is possible to find a structure on which to base the game or, as some authors like to call it, a "grammar" for the planning of simulation games (Duke, 2007).

This grammar is the result of thoughts on theoretical and empirical processes and it is always necessary to use it to compare the participants' characteristics, the context in which the game is played, and the observations of games in progress.

Starting from these considerations, we intend to carry out a theoretical and methodological investigation on the projection of simulation games for learning mathematics in order to help the readers become competent in the planning of such activities.

This work, therefore, presents a theoretical and methodological frame of reference for simulation games that is the result of the work carried out by our research project, called *Simulandia.* The project concerns simulation games applied to the mathematic field, which involved linking the content and procedures of the games to the educational objectives of the project.

Within this context, the relevant models and the games that have been developed shall be discussed in detail. On the basis of the characteristics highlighted in the model, we shall present- ever bearing in mind the complexity and the non linearity of the activities therein- a clear and detailed guide to the project, divided