Chapter 4
Simulation Games for the Learning and Teaching of Mathematics

Angela Piu
University of L'Aquila, Italy

ABSTRACT

The chapter presents the educational perspective within which the simulation games for learning mathematics are presented, as well as a number of considerations on the implementation of teaching course and environments. The main decisions taken for the design of simulation games are introduced, whereas the methodological aspects will be studied in greater depth in later chapters.

"When I used to attend lower secondary school I was very good at doing expressions, a task which I greatly enjoyed. I carefully carried out the calculations in the right order and helped my classmates by inventing ways for them to solve problems. The question I always asked myself was: What use are these expressions? What advantage can be gained from them? The textbook we used at school claimed that an expression achieves… and/or …… but it provided no information at all regarding my query. Nor did my teacher who, being a graduate in biology, had no great love of mathematics and made no secret of the fact. I had no alternative but to search for an answer on my own and I'm still searching! However, I will tell you how I went about the task: I tried to think of situations or contexts in which that expression

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could have been useful, or I tried to think up possible situations…… undertaking a mental voyage of discovery that, though I was still rooted at my desk, allowed me to visit other contexts of life and bring them back to the classroom, or simulate them in my mind. I set out, in other words, to reconstruct a context in which, by hypothesising problem situations it would become possible to manipulate numbers and find out the results, but without being in any sense oppressed, in which the mechanically resolved operations could acquire a meaning for me and my schoolmates, opening the door of the classroom on the world from which we had come, the daily life of each person with his or her bundle of experiences, and towards which we returned, in which the parenthesis told us something about our daily lives. I had the impression of working inside a greenhouse, in an environment that was not basically aseptic in which the mathematical contents could have a life of their own, but were at the same time protected, a place where I could nourish and cultivate my ideas by using the resources of the soil and the sun, recomposed according to the needs of the moment, within a systematic thought process, in order then to be able to take them to the fruit and vegetable market…. mathematical and otherwise."

INTRODUCTION

Unlike other species, aside from first order primates on rare occasions, human beings deliberately teach other human beings in situations removed from the contexts in which the knowledge acquired is put to use (Bruner, 1997). We are the only species, in other words, that teaches its young in a de-contextualised manner (Bruner, 1997). Such an organisation becomes possible, Bruner claims, by the use of language and by our predisposition for inter-subjectivity, i.e., the ability of human beings to understand through language, gestures and other means what others have in mind; this includes inferring the meaning from the context and negotiating meanings even when the words are ambiguous.

If it is the case that language enables us to transmit the contents of one culture to another and negotiate meanings in a de-contextualised context, it is nevertheless worth remembering that there are also other factors influencing the young that guide their learning process. Gardner (1994) has identified these: the need to conceptualise the world in terms of objects, space, time and causality; the internal limits to knowledge that enable us to define time and causality, and recognise objects in terms of broad categories- in other words, ontologies through which we group certain things together but not others; intuitive theories on the physical and social world, constructed thanks to our interaction with the world of objects that are destined to