Chapter 13
Activating a Self–Regulated Process:
The Case of a Remedial Activity within an ICT Environment

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ABSTRACT
This contribution is based on a research study which aims at investigating the benefits coming from the use of the Aplusix ICT environment in a remedial intervention in Algebra. The authors start from elaborating a theoretical reference frame for Self-Regulated Learning in order to make it suitable to reformulate and investigate the specific pedagogical problem of a remedial activity in Algebra (first year of the upper secondary school, 9th grade). Then, the authors present the design of a teaching intervention that has been carried out at school, centred around the use of Aplusix. Finally, they discuss some results from the analysis of the data collected during the experiment. The study’s results show clear evidence of the evolution of students’ awareness and self control, i.e. they have become self-regulated learners.

INTRODUCTION
This contribution is based on a research study which aims at investigating the benefits coming from the use of the Aplusix ICT tool (Nicaud, Bouhineau, Chaachoua & Trgalova, 2004; 2006) in a remedial intervention in Algebra. Assuming the intervention of the teacher on students’ failures to be non-effective, a different pedagogical approach has been designed to help students to overcome...
their difficulties (Maffei & Mariotti, 2006; 2007). The leading principle involves creating a learning environment centred on the use of the ICT environment in which students engage directly in the remedial activity. As students interact with the new element, Aplusix, a new net of relationships emerges in which the role of the teacher changes dramatically. In particular, the traditional teacher-student relationship with respect to the didactical problem of overcoming encountered difficulties, is substituted by a new ICT-student relationship with respect to the specific difficulties encountered by each student.

In this chapter, after a general description of our specific didactical problem, we elaborate on the Self-Regulated Learning (SRL) theoretical perspective in order to reformulate the pedagogical problem of the remedial intervention. Then, we present the design of a teaching experiment aimed at investigating the role of the Aplusix ICT tool in such a remedial intervention. Finally, we discuss some results coming from the analysis of the data collected during the experiment in the perspective of SRL.

Even if we present a very limited contribution to the general issue of developing SRL, we believe that our analysis acquires its value beyond the limits of the specific case of the Algebra domain. The obtained results seem to open new perspectives concerning the use of a particular ICT environment with respect to both the specific objective of calculus skills and the more general objective concerning the development of meta-cognitive attitudes, i.e. consciousness and control of one’s own activity. In other words, the specific learning environment set up on the basis of the student-tool interaction, seems to determine significant changes in pupils’ attitude towards their own errors and impasses, showing its effectiveness in fostering self-regulated learning processes.

**SELF-REGULATED LEARNING: THE CASE OF A REMEDIAL INTERVENTION IN ALGEBRA**

**The Didactical Problem**

Italian curricula consider students’ acquisition of algebraic skills in performing calculation a main goal of the first year of the upper secondary school, e.g. 9th grade. After being introduced to the main rules for expanding and factorizing, students are expected to memorize the formulas of the main products (second, third power of a binomial, difference of squares…), and to apply them to solve symbolic manipulation tasks.

A didactical problem arises: How to help pupils overcome the difficulties that they meet in gaining basic competences related to memorization and application of algebraic formulas?

Approaching this didactical issue requires considering two interlaced problematics. On one hand, we must address the intrinsic difficulty of memorizing and applying formulas; on the other hand, we must address the general problem of remedial, that is, the meta-cognitive (Brown, 2002) problem of recovering from longstanding failures and restoring a meaningful relationship between the student and the mathematical knowledge.

The data coming from experiments with the Aplusix environment (Maffei, 2004; Maffei & Mariotti, 2006) led us to make some hypotheses concerning the benefits deriving from the use of such ICT tools to support pupils in overcoming different types of difficulties, both at the cognitive and at the meta-cognitive level. Specifically, the hypotheses concerning how the use of Aplusix in a remedial intervention could foster students’ awareness and management of their own learning difficulties make sense within the perspective of Self-Regulated Learning. Here we take the more general perspective of SRL for describing and interpreting some of the results obtained in