Learning to Think: Lines of Research in Dianoia Project

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The Dianoia Project has been developing several lines of educational research pertaining to the area of Teaching and Learning to think since 1986. This contribution seeks to outline the theoretical foundations of these lines of research, describe them briefly, point out some results and products of the project and confront with others in this line, and take stock of some issues raised by the research done.

Within the conceptual framework of theories of intelligence developed in cognitive psychology, the Dianoia Project had as main objective the creation of models of pedagogic intervention in the various curriculum areas, aiming specifically at the improvement of learners' cognitive skills. The research carried out by Dianoia is distinguished both by its options of research and intervention inside the curriculum and by its focus on the use of metacognitive stategies.

The early phase of theoretical and experimental research work began in 1986. In its early stage the project issued a number of publications which were intended to diffuse not only the results obtained so far, but also this specific line of research. The second phase started in 1990 and has developed according to several lines of research, namely assessment of effects in compensatory education, problem solving in physics and mathematics and in pre-service teacher training. The research carried seems to confirm the potentialities of these interventions, while it raises some issues concerning other, non-cognitive, dimensions associated with the development of thinking.

Dianoia has been in essence an intervention project; the research conducted has been founded on a broad conceptualisation of intelligence which is not subsidiary to a single theory, but which rather gathers suggestions from various currents of research, which emphasise the role played of tactics in intelligent behaviour. The project is structured as an intervention directed towards the teaching of thinking; it offers suggestions for strategies and mechanisms that are considered to be able to promote a certain modifiability for the productivity of thinking.

In Dianoia the action research is conducted at the curriculum level. This is in line with the research - both theories and data provided by the latest work in the field - which advocates that learners learn about the use and control of their cognitive processes more effectively if they are taught directly within the various curriculum subject areas.. Besides this option directed to interventions in curriculum subject areas, Dianoia takes into account that thinking skills are acquired through the improvement of metacognition and therefore it has explored the possibility of promoting students' success through the convergence of teaching to think and teaching to think about thinking - metacognition.

The development of metacognition has proved effective in reading comprehension, in knowledge retention and retrieval, and in problem solving. Beyond the acquisitions of skills, the learner learns how to control his learning, becomes better informed, more independent and pursues a goal in his learning and also focuses more on tasks by controlling his attention. Metacognition may thus be regarded as the key ability.

As metacognitive thinking does not develop naturally, instructions have been designed to train metacognitive thinking directly and explicitly.

To make possible the acquisition by learners of a vast range of thinking skills, from the most elementary such as remembering, recognizing, comparing, and inferring, to the most complex such as problem solving, decision making, thinking creatively and critically, it is crucial to train learners in a systematic way how to use and regulate these skills. But it is also crucial to teach them directly and explicitly as well as to instruct learners about the benefits the use and regulation of thinking skills can offer them.

Indeed, learners are not to be expected to develop spontaneously such skills; nor does the study of any given subject necessarily imply that learners are likely to acquire the thinking skills they are badly in need of to evaluate and apply the subject knowledge in situations other than those in which they learn it.

Conceiving any cognitive training presupposes a definition and description as clear as possible of the skills to be trained before setting them as learning objectives and developing instruments for their measurement, by focusing on learners' cognitive and metacognitive behaviours, thus measuring the training efficacy.

In short, Projecto Dianoia's general methodology is characterized by being a methodology of intervention which capitalizes on the purposeful, systematic, and direct teaching of thinking strategies permanently reinforced by metacognition. Learners are continuously stimulated to be aware of, and control their own mental processes while they learn curriculum contents.

Such methodology is developed and tailored in different ways to meet the learning situation found and learners' age level. Diversified learning strategies placing more or less emphasis on learners' awareness and control of mental processes are then developed according to the specificity of situations.

Although Projecto Dianoia has developed its action based on the assumption that thinking teaching is more effective when done within the standard curriculum, Dianoia researchers consider it an unresolved issue. Their option can be accounted for by the following reasons:

- the act of thinking relates closely to the specific fields of knowledge, which is not conducive to conceptualize its instruction and learning out of any corps of contents;
- once confronted with unknown situations, the learner always tries to interpret them, and think about them, by using what he/she already knows, which seems to account for the teaching of thinking skills in specific contexts, familiar to the learner;
- studies developed recently in the area of problem solving in specific knowledge domains have shown the existence of strong interactions of knowledge structures and cognitive structures.