Chapter 7.9
Metacognition for Enhancing Online Learning

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INSIDE CHAPTER

The existing research in the field of traditional didactics shows that students who have good metacognitive skills often achieve better scholastic results. Therefore, it seems that students who are aware of their cognitive processes and are able to self-monitor their learning activities tackle didactic tasks with greater success. The chapter presents an analysis of studies regarding applications of metacognition within technological learning environments which have been implemented in the last few years, and this is followed by a description of the features of the Gym2learn system. This system aims to reveal self-regulating processes and guide the student in acquiring all the steps of the executive control of some important comprehension strategies for understanding hypertexts.

INTRODUCTION

The concept of metacognition has its origin in the field of cognitive science and is an open and multifaceted concept within which many different types of research problems are investigated, giving rise to the definition of a "fuzzy concept" (Flavell, 1981; Wellman, 1985).

Originally, metacognition represented an important regulatory strategy regarding awareness of

the organization and functioning of our thought processes.

Early studies of metacognition were of historical importance since they emphasized the active involvement of the student in the learning process; this involvement was achieved by informing the student about the advantages of using self-regulating cognitive strategies and allowing the student to apply them to different tasks (Brown & Palincsar, 1982).

The cognitive sciences have identified two main aspects of metacognition, namely *metacognitive knowledge,* possessed or to learn, and *metacognitive skills* related to the control and the monitoring of mental activity.

For a more detailed analysis, it may be useful to mention the principal theoretical models which have contributed to clarifying the more controversial aspects of this field of studies.

Following the theories of Flavell (1976), who was the first person to use the term metacognition in his "model of cognitive monitoring" (Flavell, 1981), it is possible to recognize four classes of phenomena which interact among themselves:

1. Metacognitive knowledge is a stable set of knowledge about cognitive processes and consists of two main features:
   ◦ The sensitivity which a subject shows in applying an appropriate strategy to resolve a particular cognitive problem;
   ◦ The variables, declarative knowledge (what I know) and procedural knowledge (I know how to do it) which the subject has about himself, a task to solve and the strategies to use.
2. Goals (or tasks) or, rather, the aims the subject intends to achieve which are of many kinds.
3. Metacognitive experiences allow the subject to organize his actions according to his aims, increasing the probability of success.

4. Actions (or strategies) refer to the cognitions or other behaviours employed to achieve the set goals and vary according to the desired outcome.

Following this model metacognitive knowledge is therefore capable of influencing goals, actions, and experiences.

For a further explanation of the metacognition concept, we consider Brown, Brandsford, Ferrara, and Campione's model (1983) where it is possible to identify four kinds of metacognitive processes:

- Predicting, which consists of the ability to hypothesise cognitive acts which may be used later;
- Planning, which consists of the ability to identify and plan a sequence of actions to reach a goal;
- Monitoring, which consists of the ability to control and progressively supervise ongoing cognitive operations;
- Evaluating, which consists of the ability to finally control the overall strategy and, if necessary, to modify it.

According to the author, metacognition is involved in all the phases of the study activities, and, in particular:

- Recognizing the need for a strategic behaviour;
- Evaluating the features of the task and searching for the most appropriate strategies from one's repertoire;
- Applying the strategy and checking its effectiveness (Campione & Brown, 1978).

Consequently, Brown states that metacognition does not consist only in an awareness of how cognitive processes function (that is the comprehension of information processing involved in complex skills), but also in the ability to plan, control,

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