Review of: "Operations of the Cognitive-Metacognitive System in Promoting Learning: a Brief Theoretical Analysis"

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This article aims to "provide a model on how the metacognitive and cognitive systems work together to facilitate learning by analyzing the works of several pioneering researchers in metacognition". For this purpose, the text is structured in several topics, which, organized in sequence, culminate in the proposed model, from which a list of three recommendations for teachers and educators is deduced.

First of all, it is important to emphasize that the text presents internal logic and its recommendations seem reasonable. However, there are some issues that deserve comment.

First Issue: Literature Review

The literature review seems to have been somewhat limited. Its last reference dates from 2012. A systematic review is not demanded since the objective of the text was not to present a comprehensive "state of the art". Nevertheless, sticking only to the pioneers, in this case, is more of a limitation than a justification.

Taking into account that the proposed theoretical model recommends contemporary applications, a preliminary doubt arises as to whether, in these last eleven years, there would not have been some significant contribution to instructing the proposed model. And this, at least in one case, seems to be the case, as we will demonstrate in the following issue.

Second issue: Nelson and Narens´s model of metacognition operation

Nelson and Narens´s (NELSON; NARENS, 1990) model of metacognition operation is the source of the presented model. As we know, they postulated the operation of metacognition on two levels; the "meta level" and the "object level", both related by two informational loops: monitoring and control. Thus, at the object level, cognitive processes would occur whose operation would inform the first (monitoring). And that, in turn, using the provided information, would modify the first (control). In this model, the term mental model is absent, but in a reduced and almost implicit form, it is possible to perceive its existence, both at the two levels and in the monitoring and control loops.

As in Nelson and Narens (1990), Sbhatu's model also postulates two levels: the meta level and the object level, here called the "cognitive level". However, there are three main differences. One is the role of mental models, which is much

more emphasized. The author understands them as a product of mental processing and communication content at both levels. Another is that he claims these levels are different systems, while Nelson and Narens (1990) understands them as a single system. And finally, the third difference is that, contrary to what these authors claim, in Sbhatu's model, the flow of information takes place from the meta level to the object level, that is, the latter is accessed by the former, while in the original model the direction is the opposite, with the object level being responsible for informing the meta level.

These differences should not be understood just in terms of personal opinion. Also, it is not a matter of true and false considerations. It is important here to discuss the aims and rationale of each of these models. Nelson and Narens (1990) seeks to describe how metamemory works, at a simpler level, as a single system. They recognize this context: "Generalizations to more than two levels can be developed, but we have no need to do so for this article". Additionally, "Nelson and Narens (1990) framework is, at its core, a functional one; that is, it focuses on the question, What purpose does metacognition serve the individual? (page 356)" (BENNETT L. SCHWARTZ; ELISABETH BACON, 2013). This means that the model is concerned with explaining a single "complex metacognitive system" (Nelson and Narens words), describing it in terms of how the system works. And finally, the model stems from an interest in explaining metamemory using introspection in a controlled laboratory environment. Therefore, the variables EOL (easy of learning), JOL (judgement of learning), and FOK (feeling of knowing), for example, have limited external validity since they should be understood in the restricted empirical context of an experiment. They are descriptions of events produced only in the course of specific tasks, explained to the research subject.

Sbhatu, on the other hand, claims to intend to build a more pragmatic model aimed at teachers and educators interested in using metacognition in the classroom. Therefore, it can be useful to understand the learning process as being composed of two interdependent systems. Likewise, one can understand the emphasis given to the role of mental models at both cognitive and metacognitive levels. Even the direction of the monitoring loop, from the meta level to the cognitive level, opposite to what Nelson and Narens (1990) claims, is reasonable in view of the objective of his theoretical model.

Nevertheless, problems arise in terms of the *priori* credibility attributable to the Sbhatu's model. On the one hand, we see in Nelson and Narens (1990) an extensive previous empirical study, both by themselves and by other researchers. In addition, an equally extensive literature review, where the references are used step by step to build the proposed model.

On the other hand, in Sbhatu's model, there is no empirical support. From the point of view of theorizing, it is observed, for the most part, the presentation of some assumptions of an implicitly axiomatic nature, from which a theoretical model is constructed. And then, a few consequences are deduced and added to some logical reasoning based on the implicit common sense of classroom practice, in order to list six steps of learners' ideal behavior. It should be emphasized that what is sought in this review is data that informs the model construction, as Nelson and Narens (1990) does. There is no demand for testing the model.

Finally, the literature reviewed mainly serves to justify the need for the model. The review presents various authors who, as a whole, build a landscape of multiple principles, objectives, fields, and study techniques, resulting in dispersed metacognitive terms and calling for a unified definition of metacognition and its components. In conclusion, he quotes Veeman et al. and states that "Researchers in the area would not come together and produce clear taxonomies of the

various components of metacognition, their descriptions, applications, etc and their relations with cognition."(VEENMAN; HOUT-WOLTERS; AFFLERBACH, 2006).

This is all relevant, but there is an eleven-year gap between the date of the most recent reference and the author´s paper. As we said before, this gap can omit knowledge relevant to the presented model. Just one example, Kralik et al. (2018) “provides a starting point for the development of metacognition in a common model of cognition” a goal similar to Sbhatu ´s. Even from before 2012, there is Efklides (2008). In figure 1 I present his theoretical model for metacognition, which is multilevel and multifaceted. It should be emphasized here that it is not the intent of this reviewer to compare models to choose the best. Rather, what I intend here is to provide examples of important studies for any effort to build theoretical models.

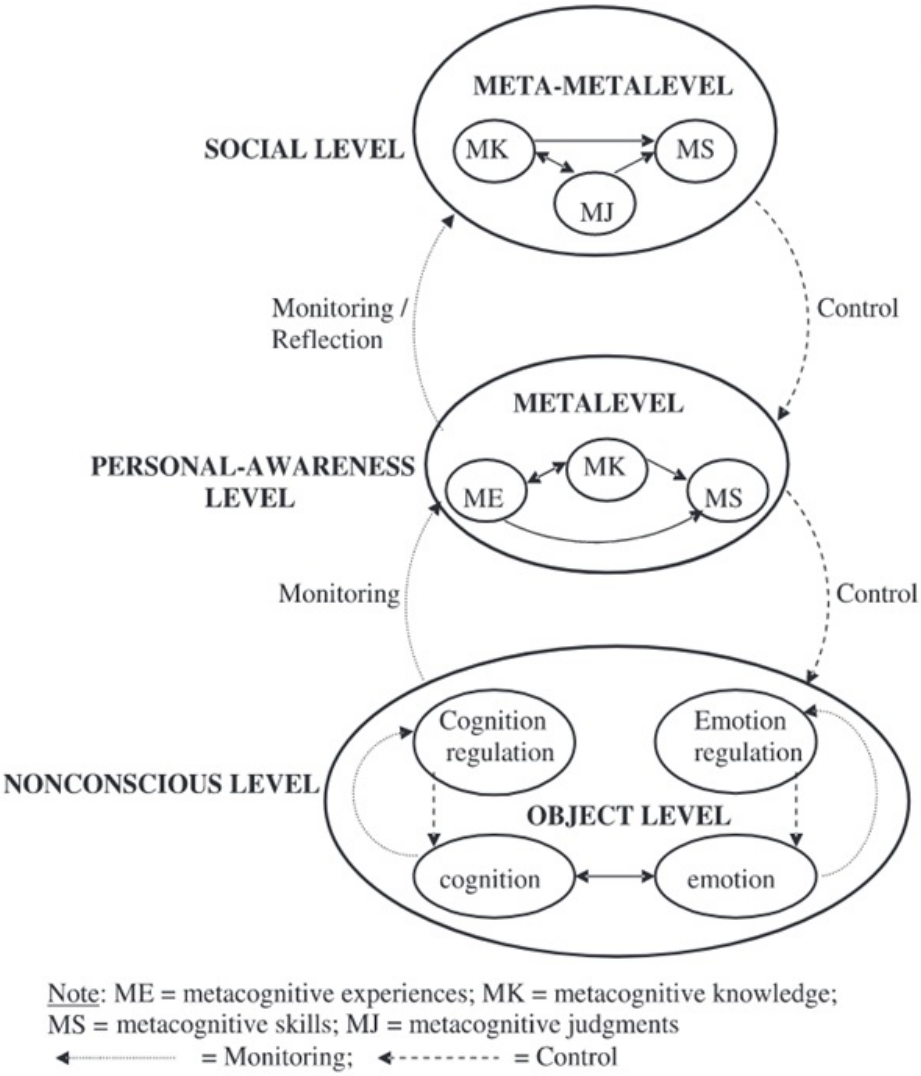

Figure 1. The multifaceted and multi-level model of metacognition.

Note: ME = metacognitive experiences; MK = metacognitive knowledge; MS = metacognitive skills; MJ = metacognitive judgments
◄····· = Monitoring; ◄---------- = Control

Third issue: Proposed description of joint cognitive/metacognitive systems and related recommendations

First, the author proposes a six-step learning process. It begins with cognitive-level models of cognitive inputs, proceeds through cognitive and metacognitive mental model processing and ends with the processing of the cognitive inputs to achieve cognitive goals.

Then he recommends that teachers and other practitioners "have to focus on helping their students to be capable of (a) generating refined meta-level models of cognitive inputs; (b) identifying and deploying appropriate and effective cognitive strategies and tools; and (c) identifying and deploying regulatory strategies and/or initiating regulatory activities."

The listing of the six steps of the learning process is reasonable and makes sense for classroom practice. Likewise, the recommendations also seem to be useful for teachers and educators. However, as they are corollaries of the proposed model, they suffer from the same limitations pointed out in the previous issue. In addition to the eleven-year gap already mentioned, there is no specific literature to support them. And also here, the lack of empirical data to inform the structure and the theoretical constructs is repeated.

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