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METACOGNITIVE REGULATION STRATEGIES IN HIGHER EDUCATION

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Abstract

The paper aims to discuss metacognitive regulation strategies in higher education. The research grounding this article was based on a qualitative research strategy, blending in-depth interviews and reflective diaries. The results of the research revealed the presence of both internal and external regulation strategies, with the prevalence of external regulation. Furthermore, lack of regulation is also possible for students with negative learning patterns. The results of the study are largely discussed and a suite of metacognitive phenomena are described. The final section of the paper provides further research directions.

Key words*:* academic learning, cognitive processing, metacognitive regulation, self-regulated learning

Introduction

Metacognition represents one of the most actively investigated, as well as fuzzy concepts of the last decade (Tobias, Everson, & Laitusis, 1999; Veenman, Van Hout-Wolters, & Afflerbach, 2006). Thus, the fascination with metacognition can turn into a challenge associated with self-regulated academic learning. To meet the need for conceptual clarity we operate a distinction between general perspectives on metacognition and those focusing on different dimensions of the metacognitive construct. In a broad sense, the concept of metacognition has been referred to as cognition about cognition, a higher order cognitive process (Veenman et al., 2006). Thus, metacognition is a form of cognition, which involves taking an active role in cognitive processes control. Wellman (1985 as cited in Veenman, Van Hout-Wolters, & Afflerbach, 2006) states that a general definition of metacognition describes a person's cognitions about cognition. John

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Flavell states the initial definition of metacognition (1976) and distinguishes between metacognitive knowledge and metacognitive regulation.

Tarricone (2011) argues the fuzziness of the concept of metacognition and identifies a potential determinant of it: the difficulty to distinguish between what is *meta-* and what is cognition (Baker, 1991; Brown et al., 1983; Cheng, 1999, *apud* Tarricone, 2011). Further, arguing the previous idea, the author asserts that the most important distinction is that the term cognition designates a constant flow of information (Langford, 1986, apud Tarricone, 2011, p. 1), and metacognition represents "knowledge and skills for monitoring and control of these flows of information".

Our opinion is consistent with the two structural dimensions stated by Flavell (1996, 2004). In addition, we underline the need of a model where metacognitive knowledge supports and actively influences metacognitive regulation. Consistent with the above, the conceptual framework of metacognition is not characterized by homogeneity. Thus, we consider useful to define a structural model of metacognition (Figure 1) that replicates the general structure proposed by Flavell (2004) and Brown (1978; 1987).

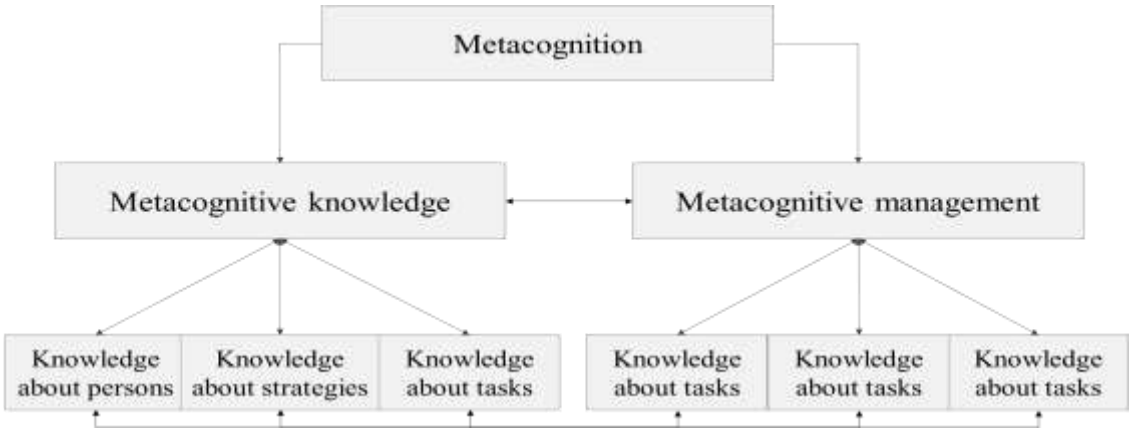

Figure 1. *Structural model of metacognition*

Based on the above model, the present paper aims to investigate metacognitive behaviors related to academic learning in students in higher education. Specific objectives are defined as follows:

O1: To describe the metacognitive phenomenology related to academic learning;

O2: To investigate regulatory behaviors in students in higher education;

O3: To assess the teacher's role of as a regulatory factor.

In the context of this study, the author hypothesizes the prevalence of metacognitive knowledge over metacognitive regulations, associated with negative metacognitive behaviors to promote

survival learning. The study revealed a suite of negative metacognitive behaviors related to negative learning patterns, namely undirected learning and reproduction oriented-learning. In the subsequent sequences, the paper unfolds methodological aspects of the research study and discusses the results.

Methodology

Participants

The participants in this research have been selected through purposive sampling (Emmel, 2013). The final sample included a number of 97 students enrolled in courses in the first university cycle of studies in the technical domain. Flyers, posters and e-mail campaigns were designed to encourage students to apply for this project. A preliminary selection was organized. During the first meeting with the selected subjects, the students were informed they would be allowed to leave the project at any time they would wish to do so. In addition, the subjects signed written informed consents. The structure of the sample is balanced according to age and gender criteria. Thus, 54 female and 43 male subjects participated in the research, aged between 19-23, $M_{age} = 21{,}4\ years.$

Procedure

The research group subjects were invited into a virtual learning community developed on the Moodle learning management system. Activities in the community were carried out over a period of approximately four months. During that interval, the subjects participated in in-depth interviews and wrote reflective diaries to describe their patterns in learning and solving academic tasks.

In the beginning of the research activity, the subjects participated in situational metacognitive interviews. Scientific metacognitive literature distinguished between three main categories of interviews (Saraç & Karakelle, 2012). According to the cited authors, a way to assess the metacognitive competence through an interview protocol requires subjects to describe the behavior in certain learning situations. An alternative consists in characterizing the mental journey after the subject has been involved in a learning task. The third form of the interviews describes a situation of a more complex metacognitive interview, in that hypothetical situations are introduced, and the subjects are asked to describe what they would do in these particular situations and generate as many problem-solving strategies that they could use (Annevirta, Laakkonen, Teemu & Vauras, 2007, Karakelle, apud Saraç & 2012). In our particular study,

thirty two complex metacognitive interviews were organized. In order to do so, the author adapted and designed an interview protocol (Manasia & Pârvan, 2014). The protocol included three sections, delimited by the pursued objective: (i) the introductory section; ii) a section dedicated to learning strategies, and iii) a section regarding learning scenarios.

In order to deepen the perspective on metacognitive behaviors in students, reflective diaries were introduced. The writing process was guided through a semi-structured log template which described five categories of desirable information to be documented: activities, goals and motivations in carrying out learning activities, associated emotions, cognitive benefits and planning. The narrative data collected through reflective diaries and situational interviews were analyzed following a content analysis protocol. For encoding the qualitative data, the author designed a coding matrix. The data analysis process was based both on qualitative and quantitative techniques, consisting in counting the number of mentions and associating them with a content category (knowledge about persons, tasks and strategies, planning, monitoring, evaluation, and self-regulation).

In this particular study, the unit of analysis consisted in message units (MU), distributed in six categories according to the structural model of metacognition. A number of 927 (MU) were analyzed and noted as positive or negative. Frequency analysis contributed to identify dominant metacognitive behaviors to be described in the subsequent section.

Results and discussions

The empirical research carried out focused on exploring the metacognitive competence of students in the academic learning activity. In addition, the author was interested in defining a phenomenology of metacognitive behaviors. Thus, we were able to bring into discussion the narrowing of metacognitive spectrum, the bi-dimensional metacognitive movement, purposive conversion, the bulldozer strategy, and the minimization of the importance of the learning task. In this section, we discuss these metacognitive phenomena in relation to the students' sociographic profile, psychological and contextual variables.

Defined as the ability to organize and mobilize declarative and conditional resources (metacognitive knowledge), on the one hand, and procedural resources, on the other hand (metacognitive regulation), the metacognitive competence is an important factor of the self-regulated academic learning. Table 1 presents the distribution of MUs according to the metacognitive dimension they refer to. It is important to highlight the fact that the metacognitive

knowledge dimension is better represented than the regulatory one. Only 25,9% of the total number of MUs are related to metacognitive behaviors involving planning, monitoring, control, evaluation, and self-regulation.

Table 1. *Subjects' metacognitive competence. Frequency analysis of the MU* (N = 927)

Students' metacognitive competence	
Content categories	**requency**
Knowledge about persons	24,5%
Knowledge about tasks	29,4%
Knowledge about strategies	20,2%
Planning	9,2%
Monitoring and control	8,9%
Evaluation and self-regulation	7,8%

The analysis of the students' responses to complex metacognitive interviews revealed the presence of *metacognitive narrowing,* consisting in involving metacognitive strategies when solving only well-structured tasks. In the case of low-structured learning tasks, the students do not apply metacognitive knowledge or planning in most of the cases (see Figure 2).

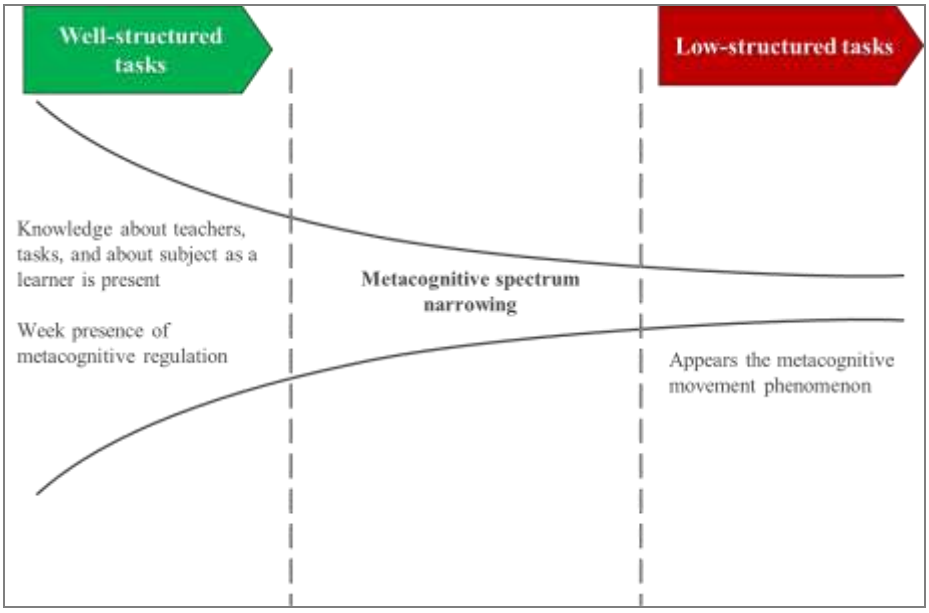

Figure 2. *The metacognitive narrowing phenomenon*

We find such a double manifestation of the phenomenon of narrowing. On the one hand, there is the dominance of the metacognitive knowledge dimension, and, on the other hand, inside this particular dimension, there has been revealed an unbalanced activation of certain types of

knowledge. The prevalent consequence in applying this processing strategy is the *metacognitive movement*. When the metacognitive movement appears, the student's responsibility in solving a learning task is declined to a fellow or to the teacher. Solving well-structured learning tasks represents a context in which the students can easily integrate metacognitive knowledge, being mostly ignored the planning, monitoring, and self-regulation. Reproductive learning tasks involve, in most cases, metacognitive knowledge: the students know how they learn in these particular cases and try to relate their performance to the teacher's evaluation strategy.

> *I know that I must repeat a text several times so that I can reproduce it to the teacher. Typically, our teacher lets us say what we know and he does not ask us other questions. It is best to learn from notes as to have time to say more things when he assesses me (M.C.).*

Metacognitive knowledge exists, can be updated easily, sometimes but not always contextualized in order to support planning activities, monitoring or self-regulation. The teacher becomes a strong referential in the selection of the strategy for solving a learning task. The teacher's evaluation style is becoming a benchmark in the selection of appropriate learning strategies. We will refer to this as a *purposive conversion strategy*.

> *When I start to learn, I think about how the teacher evaluates us. If he/ she wants us to reproduce the material, then I shall read the course notes many times. I underline or highlight with colour the important parts of the material and then I read and re-read in order to intake as much knowledge as I can (S.V.).*

In the case of low-structured tasks, in which the students are called upon to develop a new product, or to respond to a new context, the subjects prefer to decline the metacognitive responsibility vertically (to the teacher) or horizontally (to another colleague). The metacognitive movement occurs when the nature of the learning task is changed, and the intervention of the teacher can no longer constitute a sufficiently strong referential.

> *In this case, I really do not know how to learn. I hope the teacher will tell me how to cope with that […] or maybe I shall find students knowing how to do that and find a way to work together (B.M.).*

Metacognitive movement is found also in relation to the low-structured tasks, such as drafting an unstructured essay, an analysis or a reflection on a specific subject. Although approximately 25% of the registered MUs refer to knowledge about tasks, it is necessary to bring into question the value of truth of such knowledge (Manasia & Pârvan, 2014). In the scientific literature, there are voices that claim a polar value of metacognitive knowledge (true or false). Qualitative data collected in the context of our research are consistent with this idea. The large number of MUs associated with knowledge about learning tasks does not guarantee the performance in solving that task, given the fact that many of these are personal beliefs rather than propositional knowledge.

Taking into considerations the phenomenology of metacognitive behaviors in students, the author rejects the null hypothesis and accepts the alternative one. Thus, the students mostly activate metacognitive knowledge when learning occurs and narrow the metacognitive spectrum to the point where metacognitive regulation is completely missing. As argued in previous sections, the development of metacognitive competence in learning is an evolving process based on qualitative and quantitative accumulation and reshaping. The teacher and learning fellows play a dynamic role as external regulation factors. The emergence of the phenomenon of spectral narrowing and metacognitive movement supports the idea that there are students characterized by an elementary level of metacognitive competence according to the model proposed by Rey and his collaboratos (2012).

Conclusions and further research

The research in this paper focused on metacognitive competence in students in higher education. The author was interested in exploring the nature of metacognitive behaviors and their effects in learning outcomes. In relation to this research problem, we hypothesized that there is a prevalence of metacognitive knowledge over metacognitive regulatory strategies. Fogarty (1994) argues that metacognitive assisted learning is a management process that crosses three essential phases: i) planning; ii) monitoring and control; (iii) evaluation and self-regulation. The analysis of the students' learning patterns concluded a poor metacognitive regulation.

Early and unstructured forms of monitoring and control are present in terms of adjusting the time to the complexity of the learning task. In most cases, the subjects abandon the task when the solving strategy is not working, and the subject will allocate too much of his / her studying time. Most of the subjects do not seek alternative solving solutions. In such cases, the evaluation and self-regulation processes are not present. Situational interviews revealed the presence of the metacognitive movement, in which the students transform the internal regulation into an external one. The phenomenon of metacognitive movement is most obvious in the case of low or unstructured learning tasks. In solving such tasks, students presume that the lack of solving recommendations derives from the fact that they are not needed in that context. Thus, drafting an unstructured essay, for example, is more a function of inspiration, of a certain emotional disposition to write and depends less on documenting and planning the activity.

The absence of reliable knowledge about tasks influences the selection of a strategy to solve unstructured tasks. In fact, most students do not consider that it could be a strategy in the true sense of the term. Consequently, the planning strategies are not related to learning activities. In the absence of learning objectives or explicit criteria, the students cannot perform self-monitoring

and evaluation. From the subjects participating in this research, few are those who declare that they read or re-read a homework after finishing it. The described phenomenology of metacognitive behaviors certainly interferes into the process of self-regulated effective learning. Thus, further research is needed to deeper investigate learning patterns in academic learning and relate them to teaching practices in order to improve learning outcomes.

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