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Metacognition, need for cognition and use of explanations during ongoing learning and problem solving

Savia Coutinho *, Katja Wiemer-Hastings, John J. Skowronski, M. Anne Britt

Northern Illinois University, United States

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Abstract

Two studies assessed whether: (1) high levels of task-relevant metacognition would be related to good task performance; (2) some kinds of feedback (e.g., explanations) would improve task-relevant metacognition (and hence, performance) more than other kinds of feedback; and (3) some kinds of people would be more likely to seek out and use this beneficial feedback than others. Results showed that: (1) students were able to better estimate their task performance with increasing experience at the task; (2) students who provided better estimates of their task success were more successful at the task; (3) students high in need for cognition sought out problem explanations more often than students low in need for cognition; but (4) students who scored high in trait metacognition did not seek out problem explanations more often than students who scored low in trait metacognition; (5) students who were high in need for cognition performed better at the task than those who were low in need for cognition, and (6) the receipt of problem explanations was only weakly related to high levels of task performance, if at all. The implications of these results are discussed.

Keywords: metacognition; need for cognition; learning

Previous research has demonstrated that when people are trying to learn, feedback that includes explanations of problem solutions (and not just the solutions themselves) improves task performance. Studies suggest that explanatory-based feedback has this effect, in part, because it enables individuals to better monitor their performance (Nietfeld & Schraw, 2002) and to discover,

* Corresponding author.
E-mail address: saviac@yahoo.com (S. Coutinho).

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implement and assess effective learning strategies (Kohler, 2002) that lead to increased proficiency levels (Talbot, 1997). Thus, one potential consequence of providing an explanation for how a problem might be solved is that it affects an individual's *metacognition*: individuals may become more conscious of the problem-solving process and about ways to strategize and monitor progress during that process.

However, in typical experiments, problem explanations are often imposed on people, regardless of whether they want them or not. In real-world settings, the receipt of such explanations might depend on the extent to which an individual is motivated to seek explanations out and to use them once they are received. One individual differences variable that might be related to this tendency is *trait metacognition*. Individuals who are high in trait metacognition are those who are thought to be especially likely to think about learning, to ponder strategies for learning, and to monitor their learning progress. A second individual differences variable that might be related to the tendency to seek out and use problem explanations is *need for cognition*. Individuals who are high in need for cognition are thought to be especially motivated to acquire information about, and to think about, the world around them. The research reported in this article investigates whether individuals who are high in either of these two characteristics will, indeed, be more likely to seek out explanations for problems that they encounter in the world than those who are low in these characteristics, whether such behavior is related to metacognition, and whether metacognition is related to task performance.

In the sections that follow, we will first review work on metacognition. In particular, we will briefly discuss how metacognition might be related to task performance and how metacognition might be affected by problem explanations. A second section will review the construct of need for cognition and will attempt to relate need for cognition to the seeking of performance feedback and to problem-solving performance. Subsequent sections will describe our research and its implications.

1. Metacognition

1.1. Metacognition and performance

Metacognition is an umbrella term that subsumes metacomprehension, self-monitoring, metacognitive monitoring, and self-directed learning. That is, metacognition refers to higher-order mental processes that are often involved in learning — making plans for learning, monitoring learning rates, and predicting performance (Dunlosky & Thiede, 1998). The possession of good metacognitive abilities is thought to improve performance (Dunning, Johnson, Ehrlinger, & Kruger, 2003), and data suggest that many individuals lack such abilities. For example, a meta-analysis by Mabe and West (1982) revealed that people often misperceive their own ability levels. Kruger and Dunning (1999) showed that in academic settings, such miscalibration is especially characteristic of poor academic performers. The implication is that good metacognition (in the form of good calibration) leads to good academic performance.

A similar conclusion comes from Everson and Tobias (1998), who found that metacognitive ability (as measured by metacognitive word knowledge, or KMA) was a predictor of word test performance. Their results suggested that when trying to learn word skills, students high in KMA were especially likely to realize what they did not know and to take steps to remedy the problem (e.g., engage in relearning strategies). The ability to accurately engage in metacognitive monitoring and to engage in