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Short Communication

The Relationship between the Need for Cognition, Metacognition, and Intellectual Task Performance

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This study examined the relationship between the need for cognition, defined as the tendency to engage in effortful cognitive activity, and metacognition which is one's thinking about thinking and how these variables relate to intellectual task performance. Participants completed measures of need for cognition, metacognition, and problem-solved GRE analytical items. There was a significant correlation between the need for cognition and metacognition. However, only the need for cognition was a significant predictor of intellectual task performance.

Key Words: cognition, metacognition, GRE analytical item.

INTRODUCTION

Research has focused on variables such as learning styles, cognitive strategies, goals, and test anxiety in their relationship to academic performance and learning. The recent focus in the educational psychology literature on learning variables provides hope that these variables can be taught to students to augment learning and academic outcomes. This study examined how metacognition and need for cognition relate to each other and to performance on intellectually stimulating tasks.

Metacognition refers to one's ability to know and regulate cognitive processes (Schraw & Moshman, 1995). Flavell (1979) conceptualized metacognition as "knowledge and cognition about cognitive phenomena". Simply stated, metacognition is thinking about your thinking. Metacognition has been described as the ability to calibrate or monitor one's performance and chart learning plans based on learning and performance estimates (Dunlosky and Thiede, 1998). Good metacognition extends beyond the academic periphery and may be responsible for effective leadership, procuring promotions in the workplace, and achieving similar salient goals in life (Kruger and Dunning, 1999). Kruger and Dunning successfully demonstrated the extent of individual differences in metacognition. Participants in their study provided estimates of their performance and their peers' performance before they took tests. Students with poor metacognition provided inflated estimates of their performance relative to their peers and failed to recognize their erroneous responses on test items. Students with good metacognition provided realistic estimates of their performance preceding the test and were able to recognize items they failed to respond to correctly.

Metacognition is a strong predictor of academic success and problem-solving ability (Dunlosky and Thiede, 1998; Theide et al., 2003). Students who are able to effectively discriminate between information they have learned and information they have not learned are more likely to review and learn new information (Everson and Tobias, 1998). If students believe they know everything for the test, they will probably end their studying. Premature cessation of studying before learning is completed will most likely result in poor performance. Fortunately, students with poor metacognition are not doomed to poor learning and inadequate performance. A vast body of research has consistently shown that metacognitive training, in addition to task-based training, is effective in improving learning and performance outcomes (Thiede et al., 2003; Kruger and Dunning, 1999; Leasure, 1997; Kohler, 2002).

The Need for Cognition

A second variable investigated in this study is the need for cognition. The term *need for cognition* emerged when Cohen, Stotland, and Wolfe (1955) conducted studies on cognitive motivation. They conceptualized the need for

cognition as “a need to structure relevant situations in meaningful, integrated ways. It is the need to understand and make reasonable the experimental world”. Cacioppo and Petty (1982) further honed the definition of the need for cognition as “the tendency to engage in and enjoy effortful cognitive activity”. People with a strong need for cognition are intrinsically motivated to think. They seek out and enjoy complex cognitive tasks. People with a weak need for cognition are described as “cognitive misers” (Taylor, 1981) who choose not to expend energy on thinking.

Cacioppo and Petty (1982) referred to the need for cognition as a process-oriented individual difference related to the preference and motivation to relish complex information processing that influences the tendency to expend time and energy on rigorous mental tasks. The need for cognition is related to academic performance, particularly at the college level where coursework requires effortful thought and influences comprehension of coursework and academic grades (Leone and Dalton, 1988; Sadowski and Gulgoz, 1996). Students with a strong need for cognition utilize elaborative, deep, and comprehensive learning strategies which translate into a deeper understanding of information and good performance.

The current study investigated the relationship between metacognition and need for cognition and the influence of these variables on intellectually demanding tasks. A significant correlation was expected between the need for cognition and metacognition as students who have a strong desire to understand and comprehend may utilize strong metacognitive skills to achieve this goal. The use of strong metacognitive strategies, combined with a high need for cognition, was expected to translate into good performance on intellectual tasks. This study utilized GRE analytical items as a measure of intellectual activity. GRE analytical items are cognitively challenging and require deep comprehension to be solved correctly. Metacognition and need for cognition were expected to be strong predictors of performance.

Method

Participants

Participants were 417 undergraduate students (209 women and 208 men) enrolled in an Introductory Psychology course at Northern Illinois University. Ages ranged from 16 years to 46 years (M = 19.16, SD = 2.47). Students participated in this experiment to fulfill class requirements. Seventy-seven percent of students were freshmen, 16% sophomores, 6% juniors, and 1% seniors.

Materials

Need for Cognition: Participants completed the 18-item need for cognition scale (Cacioppo, Petty, & Kao, 1984) on a 9 point Likert scale ranging from (1) strongly disagree to (9) strongly agree. Scores on the appropriate items were reverse coded as recommended by Cacioppo et al. and were summed to obtain an overall score for the need for cognition.

Metacognition: Participants completed the 34-item trait metacognitive inventory (Hong & O’Neil, 2001). Participants responded to each item on the following 4-point Likert scale: (1) almost never, (2) sometimes, (3) often, and (4) almost always. Scores on were summed to obtain a composite metacognition score.

Intellectual Problems: The measure of intellectual problem-solving in this study was performance on GRE analytical items. Participants completed ten GRE analytical items from the test preparation guide entitled GRE: Practicing to take the General Test (Educational Testing Service, 1990). This book provides an estimate of item difficulty for each GRE analytical item. Item difficulties at specific levels were chosen by to reduce floor and ceiling effects so that some items were particularly challenging and some items were easy. There were 2 easy items, 4 difficult items, and 4 very difficult items. See Appendix A for a sample GRE analytical item.

Procedure

Participants were told that the purpose of the study was to understand problem solving among college students. All participants signed an informed consent form. Participants completed the NCS, TMC, and solved ten GRE analytical items. On completion, participants were thanked and dismissed.

RESULTS

Descriptive: Descriptive statistics for the need for cognition, metacognition, and intellectual task performance are reported in Table 1. There was a normal distribution of scores for need for cognition and metacognition. However, floor effects were observed for GRE performance scores. Most participants found the GRE items too difficult to solve and were able to solve few items successfully.

Table 1. Means, Standard Deviations, Minimum and Maximum Scores.

Variable	M	SD	Min	Max
NCS	103.92	20.08	38.00	160.00
GRE	2.50	1.65	0.00	8.00
TMC	91.56	14.00	58.00	134.00
N				417

Correlations and Regressions: There was a modest correlation between the need for cognition and metacognition (r=.36, p=.01). There was also a significant correlation between the need for cognition and intellectual task performance (r=.24, p=.01). However, there was no significant correlation between metacognition and intellectual task performance (r=.08, p=.13). Next, a regression analysis was conducted with metacognition,

need for cognition, and the interaction of metacognition and need for cognition predicting intellectual task performance. The interaction was not significant, β= -.01, *t*= -.24, *p*=.82. Only need for cognition was a significant predictor of intellectual task performance β= .25, *t*= 4.81, *p*=.01. Metacognition was not a significant predictor of intellectual task performance, β= -.01, *t*= -.25, *p*=.80.

Discussion

This study examined the relationship between the need for cognition and metacognition and how these variables relate to intellectual task performance. Students completed items from the GRE analytical subtest and this was used as a measure of intellectual task performance. Only the need for cognition was a significant predictor of performance. Students who had a strong desire to understand and solve complex problems tended to respond accurately to these problems. Metacognition did not appear to benefit students in performance terms as students with good metacognition did not score significantly better than students with poor metacognition. This finding was unexpected as students with good metacognition were expected to use their metacognitive strategies to solve the problems. However, it could be the case that problems were too difficult for students to solve and students with good metacognition might have realized this and not invested effort in solving the problems.

There are some limitations to this study. The survey nature of the study makes it difficult to verify if students are accurately reporting their need for cognition and metacognition. As suggested earlier in this article, Kruger and Dunning (1999) have shown that poor performers often have inflated estimates of their abilities. Therefore, this research reflects the perceptions of need for cognition and metacognition on intellectual task performance. Nonetheless, this research sheds light on the importance of need for cognition on intellectual task performance. While metacognition is a predictor of academic performance as shown in other research studies (Dunlosky and Thiede, 1998; Theide et al., 2003), the need for cognition is equally or even more important in successfully solving cognitively challenging problems. These research findings can be used to support training programs encouraging poorly performing students to adopt a quest for learning approach to academics and in ife.

Sample of GRE Analytical Item

Statistics over four consecutive years showed that four percent more automobile accidents happen in California during the week following the switch to daylight saving time and during the week following the switch back to standard time than occurred the week before each event. These statistics show that these time changes adversely affect the alertness of California drivers. The conclusion in the argument above is based on which of the following assumptions?

(A) Drivers in California as well as those in the rest of the United States have similar driving patterns.

(B) The observed increases in accident rates are due almost entirely to an increase in the number of minor accidents.

(C) Four years is not a sufficiently long period of time over which to judge the phenomenon described.

(D) There are no other factors such as school vacations or holiday celebrations that cause accident rates to rise during these weeks.

(E) A time change at any other time of year would not produce a similar increase in accident rates. Correct Answer: D

Percentage of students responding correctly*: 56%

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