The Relation Between Metacognitive Awareness and Regulation

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Abstract

Metacognitive responsiveness is an individual's sensitivity to metacognitive experiences, awareness, and importance of metacognition, and thus can be helpful in terms of finding out the different levels of metacognitive competencies. This study aims to investigate whether and how different components of metacognition predict metacognitive responsiveness if at all. The first instrument used in this study is the "Metacognitive Awareness Inventory" (MAI) by Schraw and Dennison (1994) to assess the metacognitive awareness levels of students. The second instrument used in this study is the "Awareness of Independent Learning Inventory" (AILI) by Meijer et al. (2013) to assess the metacognitive responsiveness of the students. In this regard, the items covering the metacognitive responsiveness subcomponent (α=0.77) were utilized in this study. Multiple linear regression analysis confirmed metacognitive components predicted metacognitive responsiveness, and predictor variables (MK and MR) explained 23% of the variation of MRS. Metacognitive regulation (MR) explained %49 of the variation of MRS. Findings might suggest that when a person is metacognitively responsive, they may be stimulated by an internal or external factor that requires them to regulate their cognitive activity. In this sense, a potential implication pertains to using stimuli to activate individuals' metacognitive regulation; that is, there is a need to awoke a meaningful purpose to engage in planning, monitoring and controlling, and evaluating their cognition. For this, materials that appeal to learners need identification. As each individual may bring diverse characteristics, both research and classroom practices should recognize individuals' differences and tendencies in developing metacognitive competencies.

Keywords: *Metacognition, Metacognitive awareness, Metacognitive regulation, Metacognitive responsiveness, Materials for metacognition, Pre-service teachers*

Introduction

One of the 21st-century skills has to do with thinking, and maybe it is about *thinking about thinking*, which is metacognition. The research on metacognition shows that metacognition enhances better learning (Veenman, Elshout & Meijer, 1997) and it might be an important indicator of the difference between high and low achievers (Paris & Jacobs, 1984). The research also demonstrates that metacognition can be successfully taught (Schraw, 1998; Pintrich, 2002; Veenman, Hout-Wolters, & Afflerbach, 2006; Zohar & Ben David, 2009; Ozturk, 2015). This is to say that if we successfully manage to teach metacognition in classrooms through metacognitive instruction and materials promoting metacognition, student achievement will be positively affected by that. However, research in the national context does not really support the idea that metacognition is effectively taught at schools (İnce & Duran, 2013; Sulak & Behriz, 2018; Erdağı Toksun & Toprak, 2019; Yemenici & Ulu, 2020). Some studies abroad found out that teaching metacognition is not very common in class or not effectively performed

since the instructors have a hard time due to lack of their competencies, pedagogies of metacognition, and external factors such as crowdedness of classrooms, time and place limitations and appropriate materials (Duffy, 1993; Fisher, 2002; Kerndl & Aberšek, 2012). In line with these studies, studies on students' metacognitive awareness levels and skills demonstrate poor results, especially in the national context (Öksüz & Kapucu, 2015; Altunkaya & Sülükçü, 2018; Sevgi & Çağlıköse, 2020). So, the overall picture of metacognitive instruction of teachers and metacognitive awareness levels and skills of students is not very optimistic in Turkey. As mentioned above, it seems that metacognitive instruction is not effectively practiced at schools in Turkey. One might argue that another reason for that could be not taking into account students' individual differences, that is to say, some students might suffer from availability deficiency of metacognition while some might suffer from production deficiency of metacognition. The first refers to the lack of metacognitive knowledge and skills in students' learning repertoire so the metacognitive instruction should start from the base level, and the latter refers to the failure to use certain levels of metacognitive knowledge and skills due to issues such as task anxiety, task difficulty, lack of motivation, etc. (Veenman, Hout-Wolters, & Afflerbach, 2006). So, individual differences in students' metacognitive knowledge and skills should be an important factor to be considered when planning metacognitive instruction. To do that, we can examine students' metacognitive responsiveness levels and find out the different levels of sensitivity to metacognitive experiences, awareness, and importance of metacognition in their eyes, and their curiosity to learn about it. One might argue that we can promote teaching metacognition more efficiently if we know what kind of stimuli evoke metacognitive responsiveness in students. For that matter, the aim of this study is to investigate how different components of metacognition predict metacognitive responsiveness. Therefore, classroom practices of metacognition may bear fruitful products or outcomes to enhance better learning.

Theory of Metacognition

Flavell's theory explains the psychological phenomenon of metacognition. According to him, metacognition simply refers to ''thinking about thinking'' (Flavell, 1979). Flavell's theory of metacognition includes three facets of metacognitive processes: 1) metacognitive knowledge, 2) metacognitive experiences, 3) metacognitive strategies. Flavell (1979) asserts that learning is effective when cognition is controlled by these three different aspects. In Flavell's theory of metacognition, there are three types of metacognitive knowledge. First, knowledge about

strategies includes the cognitive and social strategies to utilize better learning. Second, knowledge about task includes the nature, purpose, and requirements of certain tasks in spesific situations. Finally, knowledge about person includea the characteristics and motivations of one's own cognitive processes. Veenman, Hout-Wolters, & Afflerbach (2006) states that metacognitive knowledge pertains to knowledge about interactions of strategy, task, and person variables when understanding what influences cognitive activities. Paris & Jacobs (1984) categorizes metacognitive knowledge differently, that is to say, as declarative, procedural, and conditional knowledge. Declarative knowledge means one's self-knowledge, meaning understanding and awareness, about a cognitive enterprise. Procedural knowledge means the awareness of one's thinking by knowing how to use certain strategies. Conditional knowledge, on the other hand, helps individuals to know how and when to use certain strategies by making them aware of the conditions of their cognitive processes (Jacobs & Paris, 1987).

Another facet of metacognition is metacognitive experiences. They refer to the cognitive or affective experiences that relate to a cognitive enterprise (Flavell, Miller & Miller, 2002). Efklides (2009) states that when learners apply metacognitive strategies to learning situations, metacognitive experiences emerge as feelings and judgments before, during, and after the learning situations. To Efklides, metacognitive experiences are ''the interface between the person and the task'' (Efklides, 2009). To Flavell (1979), metacognitive experiences work together with metacognitive knowledge and strategies to inform and regulate the activation of the metacognitive knowledge and strategies. In this context, Efklides took Flavell's definition of metacognitive experiences one step further.

Another facet of metacognition includes metacognitive strategies. Metacognitive strategies pertain to the conscious use of strategies like time/effort allocation, planning, monitoring and regulating the cognitive process, and evaluating outcomes (Jiang, Ma & Gao, 2016). In particular situations, these strategies can be changed, regulated, or can be used more or less accordingly (Lin, Schwartz & Hatano 2005). To Veenman (2005), metacognitive strategies pertain to the procedural knowledge to regulate and control one's learning activities. By using metacognitive strategies, task performance is effectively enhanced (Paris & Jacobs, 1984). This facet of metacognition is maybe the most studied one compared to other facets of the theory.

On the other hand, there is another facet of metacognition theory that is included later on by other researchers. Metacognitive responsiveness, described as individuals' sensitivity to

metacognitive experiences, awareness, and importance of metacognition, and the curiosity to learn about metacognition (Meijer et al., 2013), might emerge as another important pillar of metacognition. Metacognitive responsiveness should be recognized since it is may help us to understand how individuals are motivated to engage in metacognitive experiences when they do, plus to see whether their information about self, tasks, and goals influence their performances. Meijer et al. (2013) emphasize that metacognitive responsiveness was specifically represented by (a) sensitivity to internal feedback, (b) sensitivity to external feedback on cognitive functioning, (c) curiosity about cognitive functioning and development.

Method

Research Design

This study is conducted in the quantitative realm by gathering data with survey from students. The design of this study can be classified as correlational design, as it focuses on describing the relationship between two variables without interfering withnany of them (Fraenkel, Wallen & Hyun, 2012). Since this research aims to examine how metacognitive responsiveness is influenced by various components of metacognition, it is best to describe it as a prediction study.

Participants

In this research, the convenience sampling method was used to reach out to available participants in the easiest way (Fraenkel, Wallen & Hyun, 2012). The study included 134 university students in the English Language Teaching department of a state university. The participants varied in grades and gender. The table below shows some demographic information about the participants.

Table 1

Participant Demographics

Gender	f	Grade	f
Male	46	Freshman	54
		Sophomore	34
Female	85	Junior	33
		Senior	13
Prefer not to say	3		

A portion of 63,4% of the participants were female (f=85) while 34,3% were male (f=46) and 2,2% preferred expressing no gender (f=3). Regarding the grades of students, 40,3% of them were freshman students (f=54), 25,4% were sophomore students (f=34), 24,6% were junior students (f=33), and 9,7% were senior students (f=13).

Data Collection Tools and Procedure

The research data were collected in the fall semester of the 2021-2022 academic year. The data collection process took place face to face and it included two different forms. The first section included a consent form and demographic information about the participants. The second part included two different data collection tools for different purposes.

The first instrument used in this study is the "Metacognitive Awareness Inventory" (MAI) by Schraw and Dennison (1994) to assess the metacognitive awareness levels of students. MAI is proven to be a valid and reliable tool with alpha scores ranging from .93 to .88. Pintrich, Wolters & Baxter (2000) state that since the metacognitive awareness scores and academic achievement of students are strongly correlated, the tool has an external validity as well. The instrument includes 52 items factored on knowledge about cognition (17 items) and regulation of cognition (35 items). As advised by the researchers themselves, a 5-point Likert scale was used while using this inventory. The reliability of research results was also attempted to be ensured. With this regard, reliability analysis was performed on the data set. To Pallant (2001), having an alpha coefficient (α) bigger than .60 means that the scale is internally reliable and adequate to use. Initially, the first data collection tool was examined and the Cronbach's alpha reliability coefficient for the whole MAI scale was .90. The metacognitive regulation subcomponent had an alpha coefficient value of .86, and the metacognitive knowledge subcomponent had an alpha coefficient value of .81.

The second instrument used in this study is the "Awareness of Independent Learning Inventory" (AILI) by Meijer et al. (2013) to assess the metacognitive responsiveness of the students. That is why only the items covering the metacognitive responsiveness subcomponent (α=0.77) were utilized in this study (10 items with 6 negatively worded) accompanied by a 7-point Likert scale. The subcomponent was divided into three parts in the instrument as; a) sensitivity to metacognitive experiences, b) sensitivity to external feedback, and c) curiosity about cognitive functioning and development. AILI, as the second data collection tool that was examined, its Cronbach's alpha reliability coefficient for the metacognitive responsiveness subcomponent was .61.

Analyses

Descriptive statistics and multiple linear regression analysis were employed for the analysis on SPSS 22. Descriptive statistics were used to demonstrate the profile of the participants. The regression analysis was used to examine how certain metacognitive components predicted metacognitive responsiveness. Before running the regression analysis, the normality of scores was examined by looking at the skewness and kurtosis levels and the assumption of normal distribution of the data was not violated. The linearity assumption was tested by looking at scatter plots of the data and it was observed that the relationship between independent variables and the dependent variable was linear. Condition indices (CI), variance inflation factor (VIF), and tolerance values were checked to ensure the predictor variables were not highly correlated with each other. The CI values were less than 30, the VIF values were less than 3, and the tolerance values were greater than .40 meaning the collinearity assumption was also met.

Results

According to multiple linear regression analysis used to test if any of the metacognitive components predicted metacognitive responsiveness, it was seen that the two predictor variables explained 23% of the variation of MRS, while metacognitive regulation (MR) explained 49% of the variation of MRS, (R^2 = .24, F(21,723) = 2, p = .000).

Table 2

Model Summary

Model	*R*	R^2	*Adjusted* R^2	*SE*
1	,499	,249	,238	,63776

Zero-order coefficient values showed a higher correlation between MRS and MR (.49) than MRS and MK (.33).

Table 3

Multiple Linear Regression Coefficients

	ß	*Standart Error*	*Standart ß*	*t*	*p*
Constant	2,040	,515		3,962	,000
MK	-,051	,166	-,033	-,307	,760
MR	,909	,187	,522	4,872	,000

The findings indicate that the metacognitive regulation component of metacognition predicts metacognitive responsiveness (ß = .90, p<.01) of almost half of the students. Metacognitive knowledge, however, did not strongly influence (ß = -.05, p>.01) metacognitive responsiveness.

Discussion, Conclusions and Recommendations

Metacognitive responsiveness was categorized into three subdimensions by Meijer et al. (2013); sensitivity to internal feedback (metacognitive experience), sensitivity to external feedback, and curiosity about cognitive functioning and development. Findings might suggest that when a person is metacognitively responsive, they may be stimulated by an internal or external factor that requires them to regulate their metacognitive activity. Since metacognitive regulations include strategies for monitoring and checking cognitive processes, they can be influenced by metacognitive experiences, which are one's own thoughts and feelings about their cognitive functioning, to change or adapt new strategies (Flavell, 1979). So, students with higher metacognitive regulation skills would be more metacognitively responsive to general awareness and the importance of metacognition. Because they may think that they have the tools to deal with the stimuli. One may know about the task or strategies, but not prefer to engage in it, as they might think that they cannot manage the demands.

Recommendations

As Butler & Winne (1995) and Shraw (1998) state, teachers should promote the general awareness and importance of metacognition. Teachers can do that by choosing relevant tasks and materials that will help students to use their existing metacognitive regulation skills, or generate those so that students can be more sensitive toward their internal and external feedback, and be more aware of their engagement in a learning process. In this sense, a potential implication pertains to using stimuli to activate individuals' metacognitive regulation; that is, there is a need to awoke a meaningful purpose to engage in planning, monitoring and controlling, and evaluating their cognition. For this, materials that appeal to learners need identification. As each individual may bring diverse characteristics, both research and classroom practices should recognize individuals' differences and tendencies in developing metacognitive competencies.

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