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The Nature of Metacognitive Awareness in Foreign Language Learners and Its Interaction with Creativity

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***Abstract*—Recent evidence suggests that second/foreign language learning and cognitive functions mutually affect each other. In pursuit of an earlier study which asserted the superiority of advanced foreign language learners over beginners in divergent thinking abilities, the present study examined another important cognitive function, i.e., metacognitive awareness in the same participants, that is, two groups of advanced English as a foreign language (EFL) learners and beginners through Schraw and Dennison's Metacognitive Awareness Inventory. The results revealed that there was no significant difference between the two groups on this measure. However, the correlation analysis showed that the two cognitive functions, i.e., creativity and metacognitive awareness, significantly correlated with each other either in advanced English as a foreign language learners or beginners. The significance of this correlation in language learning programs is further discussed.**

***Index Terms*—metacognitive awareness, creativity, foreign language learning, bilingualism**

I. Introduction

The term metacognition was initially coined by John Flavell, the father of the field, in 1978. It was first a subject of interest to developmental research; however, soon its application was expanded to areas of psychology, education, and even more recently cognitive neuroscience (Schneider, 2008). Although metacognition is a complex concept, it is simply and commonly known as "cognition about cognition" or "thinking about thinking" (Flavell, 1979; Jacob & Paris 1987), or in Kuhn and Dean's (2004) words, "… awareness and management of one's own thought…" (p. 270). From an educational perspective, it can be defined as "… the ability to reflect upon, understand, and control one's learning" (Schraw & Dennison, 1994, p.460).

The significance of this concept is realized through its wide application in different domains. While it was first introduced in the field of developmental research, it is currently a matter of great controversy in educational and clinical psychology, studies of motivation and, even more recently, in cognitive neuroscience (Shimamura, 2000 as cited in Schneider, 2008). Schneider (2008) saw the cause of this popularity in the vital role it plays in "everyday reasoning", assessment of "scientific thinking" and "social interactions" (p. 115).

Metacognition is comprised of two major components, namely knowledge of cognition, and regulation and monitoring of cognition (Flavell, 1979; Schraw, 1998; Schraw & Moshman, 1995). Several frameworks have been developed to define the component parts of each category. For instance, Flavell (1979) primarily classified knowledge of cognition into three types: person, task, and strategy knowledge. The first one refers to general knowledge one owns about human beings' cognitive capabilities, the second one is knowledge about the nature of the task and its processing demands, and the last one indicates the strategies that may be found useful for different tasks and in different conditions. However, several other researchers have categorized this constituent of metacognition to three types of declarative, procedural, and conditional knowledge (e.g. Cross & Paris, 1988; Schraw 1994; Schraw & Moshman, 1995).

Declarative knowledge (knowing "about" things) stands for knowledge about oneself as a learner and factors affecting one's performance; or according to Cross and Paris (1988), in the context of reading, it is an understanding of factors that influence reading. Procedural knowledge (knowing "how" to do things) invokes the appreciation and management of one's thinking. In other words, it is the knowledge about how the execution of strategies is possible. It is claimed that, higher degrees of procedural knowledge enhances more automatic performance, a larger variety of the strategies, and more efficient sequencing of them (Glaser & Chi, 1988; Pressley, Borkowski & Schneider, 1987). Lastly, conditional knowledge (knowing "why" and "when" aspect of cognition) represents the recognition of the reason and proper time to apply one's procedural and declarative knowledge (Garner, 1990 as cited in Schraw, 1998).

The second constituent of metacognition, i.e. regulation of cognition (also known as executive skills or processes; Flavell (1999, 2000) concerns a set of subprocesses and activities that regulate and control one's learning and thinking. The skills that are fundamental to this component of cognition are planning, monitoring, and evaluation (as cited in

Schraw 1998). Planning entails goal setting and selection of appropriate strategies before engaging in learning. "Examples include making predictions before reading, strategy sequencing, and allocating time or attention selectively before beginning a task" (p. 115). Monitoring refers to considerations of one's learning, task performance and strategy use while engaging in an activity, e.g. self-testing while learning (Schraw & Moshman, 1995). Unlike planning that is done prior to embarking on a task, evaluation is the final assessment of learning outcomes and regulatory strategies to see if the goals are met or evaluate one's achievement (Schraw, 1994; Schraw 1998).

There is consensus that knowledge of cognition facilitates its regulation. These components of metacognition are found to be integrated in metacognitive theories that in addition to systematizing and integrating various facets of metacognition elucidate and predict cognitive behavior (Schraw & Moshman, 1995). Metacognitive theories are of three types: tacit, informal, and formal. *Tacit theorie*s are constructed implicitly and gradually, and are usually far from the conscious knowledge of their theorists. They are formed in everyday interactions and can be influenced by culture. Lack of awareness of their existence or origin makes tacit theories difficult to change. On the other hand, *informal theories* have some degree of awareness but have never been structured systematically. They signify the early stages of recognition and awareness of processes that form metacognitive knowledge and can help modify and improve them. Due to lack of explicit instruction they develop gradually through social and personal experiences. Finally, *formal theories* are strongly systematized and explicit but quite rare. Awareness of some evidence to support and evaluate theories makes them reliable and progressive (Schraw, 1998).

It is strongly claimed that metacognition improves with age (Kuhn & Dean, 2004), and in everybody's course of life moves through the same stages, that is after the construction of tacit theories in childhood they take the form of elementary informal theories that are deemed to be domain-specific, they become more advanced in their level of formalization and will finally extend to other domains through practice and self-reflection (Schraw & Moshman, 1995). Schraw (1998) discussed the relation between cognitive and metacognitive abilities. In his view, cognitive abilities are domain-specific whereas metacognitive abilities cross domain boundaries. In a similar vein, Schraw and Dennison (1994) emphasized that unlike cognitive abilities such as aptitude and domain knowledge that may constrain one's learning, metacognitive abilities are not easily detectable.

Considering the relation between IQ and metacognitive abilities, it is acknowledged that development of metacognition is independent from IQ. Verifying this fact, Ackreman (1987) stressed the indispensable role of IQ in the early stages of learning, and its low prominence in later. Acquisition of appropriate metacognitive knowledge can mediate and compensate for differences in IQ and insufficient domain-specific knowledge. The more learners practice the acquired metacognitive knowledge, the more flexible and generalizable its application gets.

A point that is worth to be mentioned is that, the distinctive nature of metacognition makes it more lasting and general than cognitive skills that are restricted to certain domains. It is argued that high levels of domain-specific cognitive skills can facilitate the acquisition and application of metacognitive knowledge; however, it doesn't guarantee development of metacognition (Schraw, 1998).

While the research on metacognitive development of bilinguals is in infancy, it is deemed that enhanced metalinguistic awareness which is widely observed in bilinguals can be a source of improvement in metacognitive awareness. Paris, Wasik, and Turner's (1991) argument concerning metacognitive reading strategies verified that older and more successful readers have more comprehensive knowledge about themselves as learners and approach different genres in distinct ways, and that they use more reading strategies. Some researchers have posited since second language learning most often happens consciously and deliberately from the very beginning, it develops the capacity for conscious introspection, and its unique nature may cause noticeable awareness of cognitive processes (Hosenfeld, 1978; Vygotsky, 1962).

Vygotsky (1962) was one of the first theorists who put forward the possibility that cognitive differences between bilingual and monolingual children may be due to their superiority in metalinguistic awareness. In line with this claim, Ianco-Worrall (1972) reported that 4- to 5-year-old bilingual children realized the arbitrariness of language significantly more than their monolingual peers which is an indicator of enhanced metalinguistic awareness. Furthermore, it has been suggested that a certain level of metacognitive awareness is required for the learners to transfer their L1 strategies to their L2 (Miramontes, & Commins, 1989). Goldman, Reyes and Varnhagen (1984) and Moll, Estrada, Diaz and Lopes (1980) speculated that bilingual students can profit from instructional environments that promote and encourage access to their first language strengths, that is, the more successful second language learners are deemed to be those who find ways to make these connections on their own.

Moreover, it was suggested that metacognitive awareness can foster creative abilities. There are some theoretical links between metacognition and creativity (e.g., Naglieri & Kaufman, 2001). Several theorists have argued that metacognition is related to creative problem solving and that someone who is high in metacognitive ability should be a more creative problem solver (e.g., Boyce, Van Tassel-Baska, Burruss, Sher, & Johnson, 1997; Feldhusen & Goh, 1995; Jausovec, 1994; Davidson & Sternberg,1998; as cited in Kaufman, Evans & Baer, 2010). Therefore, it has been argued that high metacognitive ability is associated with more creative performance, and the reverse of this link- those with low metacognitive skills generally exhibit little creativity- has also been put forward by Kruger and Dunning (1999).

Sternburg (2006) stated that, generally, creativity is to some extent measurable, it can be improved, and it is both domain-specific and domain-general. Feldhusen and Goh (1995) attributed the diversity and expanse in the scope of

creativity to the variety of the relevant interfering cognitive activities such as metacognition, critical thinking, problem solving, and decision making that affect it and must be carefully assessed. Sternberg (2006) mentioned the investment theory (Sternberg & Lubart, 1991, 1995) which he believes to be "confluence" theory (p. 87), and suggests that creativity entails the convergence of six different but intertwined resources: intellectual abilities, knowledge, thinking styles, personality, motivation, and environmental context.

Unlike creativity, metacognitive awareness has not been so widely studied by educationalists. In the scope of education, metacognitive awareness has been investigated for domain-specific purposes. For instance, concerning second language learning, researchers have examined the metacognitive strategies that learners employ in reading, writing, etc. These studies certainly are valuable in that they find ways to get through learners' minds and help them make use of their potentialities in more effective ways. However, a question that was raised in this study concerned the impact of enhanced domain-specific metacognitive awareness on the general metacognitive capacity of the learners. Since metalinguistic awareness is partially considered as the domain-specific form of metacognitive awareness for language learners, and the evidence from previous studies suggest that bilinguals and foreign language learners have higher levels of metalinguistic awareness than beginners, the present study aimed at assessing metacognitive awareness in advanced English as a foreign language learners and beginners.

II. Methodology

A. Participants

This study compared the performance of advanced learners of English as a foreign language and their early beginner counterparts on a measure of metacognitive awareness in Iran. A sample of 60 advanced English learners aged 16 to 18 (Mean=17, SD= 1.04) who had been studying English for at least six consecutive years, and 60 beginners in the same age range (Mean= 16.4, SD= 0.6) were selected. The participants were all female and took part in the research project voluntarily.

B. Materials

1. Metacognitive Awareness Inventory (MAI)

The participants' metacognitive awareness was measured using the Metacognitive Awareness inventory (MAI) developed by Schraw and Dennison (1994). The inventory consisted of 52 multiple choice items, reflecting two major components of knowledge of cognition and regulation of cognition which were further categorized into eight subcomponents (table 2.1.). All items were written using a 5-point Likert-type scale, ranging from "strongly agree" to "strongly disagree". Due to the unfamiliarity of beginners with English, the Persian translation of this test was used. Schraw and Dennison (1994) reported an internal consistency ranging from 0.88 to 0.93. The Cronbach's alpha reliability coefficient was 0.88 for both knowledge of cognition and regulation of cognition, and 0.93 for the entire inventory, providing a reliable assessment of metacognitive awareness. Moreover, the Cronbach's alpha reliability coefficient for the present study was 0.88.

TABLE 2.1.
COMPONENTS AND SUBCOMPONENTS OF METACOGNITIVE AWARENESS INVENTORY, ADAPTED FROM SCHRAW AND DENNISON (1994)

Components	Subcomponents
Knowledge of Cognition	Declarative knowledge
	Procedural knowledge
	Conditional knowledge
Regulation of Cognition	Planning
	Information Management
	Monitoring
	Debugging
	Evaluation

2. Torrance Test of Creative Thinking (TTCT)

Torrance Test of Creative Thinking (1974) is known as the most widely used measure of creativity. It consists of four norm-referenced subscales, measuring fluency (the number of ideas and solutions), originality (the rarity of ideas), elaboration (the number of added ideas, and the ability to develop and elaborate on ideas), and flexibility (the number of different categories of relevant responses being used).

Since half of the participants did not have any knowledge of English, the Persian translation of the test was used. The validity and reliability of the Persian version are confirmed for the context of Iran by Abedi (1993). The Cronbach's alpha reliability coefficient of 0.85, assessed for the present study, confirmed its reliability.

III. Results

A. Metacognitive Awareness

The tests of normal distribution of data, as shown in table 3.1., revealed that the data were normally distributed in the two subscales of metacognitive awareness and the total metacognitive awareness. Therefore, the parametric

independent-samples t-test was carried out to compare the performance of advanced EFL learners and beginners on measures of metacognitive awareness (table 3.2.).

TABLE 3.1.
TESTS OF NORMALITY FOR METACOGNITIVE AWARENESS AND ITS COMPONENTS

	Knowledge of cognition	Regulation of cognition	Total metacognitive awareness
No.	120	120	120
Kolmogorov-Smirnov Z	0.77	0.58	0.93
Sig. (2-tailed)	0.58	0.87	0.35
Skewness	-0.1	0.13	-0.02
Kurtosis	1.2	0.49	0.96

As observable in figure 3.1., the results of independent-samples t-test indicated that there was no significant difference in the performance of the advanced EFL learners (M= 64.3, SD= 7.1) and beginners (M= 65, SD= 7.1), t (117.6) = -0.6, p= 0.5, on the measure of knowledge of cognition (table3.2.). Similarly, no significant difference was observed in the regulation of cognition between the advanced EFLLs (M= 132.7, SD= 13.7) and the beginners (M= 130.4, SD= 13.5), t (118) = 0.9, p= 0.4. As it was expected from the above results, there was no significant difference between the advanced EFL learners (M= 197, SD= 19.6) and beginners (M= 195.5, SD= 19.5), t (118) = 0.4, p= 0.7, in performance on the measure of the total metacognitive awareness. The calculation of effect size also confirmed the obtained results.

TABLE 3.2.
DESCRIPTIVE STATISTICS AND T-TEST FOR METACOGNITIVE AWARENESS AND ITS COMPONENTS

	M	SD	df	t	Sig.	Effect size (η^2)
Knowledge of cognition			117.6	-0.6	0.5	0
Advanced EFLLs	64.3	7.1				
Beginners	65	7.1				
Regulation of cognition			118	0.9	0.4	0
Advanced EFLLs	132.7	13.7				
Beginners	130.4	13.5				
Total metacognitive awareness			118	0.4	0.7	0
Advanced EFLLs	197	19.6				
Beginners	195.5	19.5				

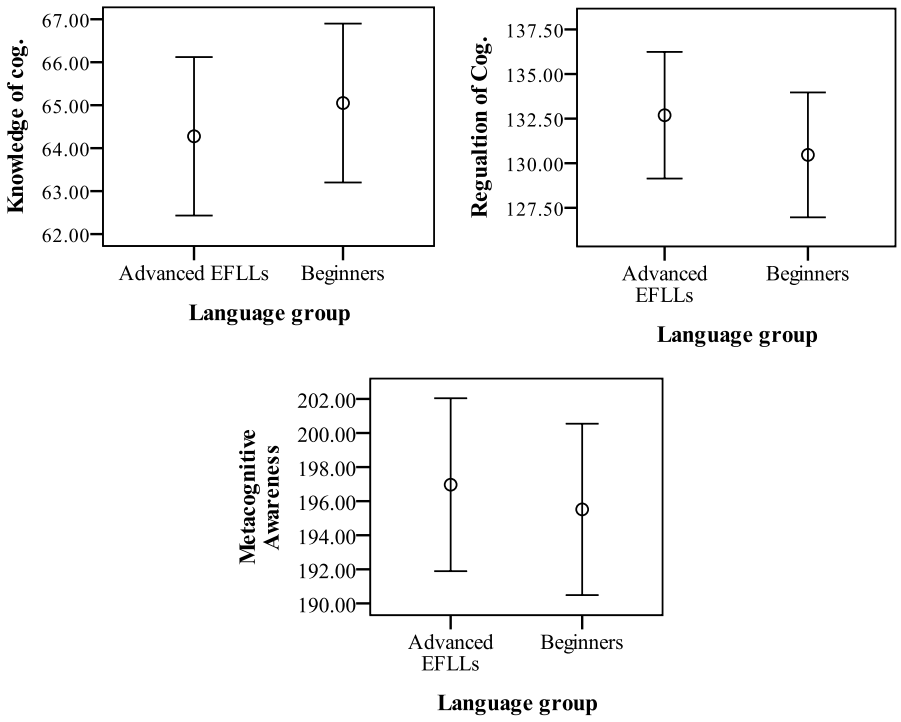

Figure 3.1. Advanced EFL learners and beginners' performance on the MAI measures of knowledge of cognition, regulation of cognition, and total metacognitive awareness, with error bars representing 95% confidence interval (N = 120).

B. Creativity and Metacognitive Awareness

As shown in tables 3.3. and 3.4., The Pearson correlation formula was used to examine the relationship between the total creativity and its four subscales, i.e. fluency, elaboration, flexibility and originality, and metacognitive awareness

and its two subscales, namely knowledge of cognition and regulation of cognition. The most noteworthy result to be reported is that, total metacognitive awareness correlated positively with total creativity either in advanced EFL learners (r = 0.33, R^2= 0.1, P< 0.05) or in beginners (r = 0.35, R^2= 0.1, P< 0.01) as asserted by their moderate effect sizes.

TABLE 3.3.
PEARSON CORRELATION ANALYSIS BETWEEN METACOGNITIVE AWARENESS, CREATIVITY, AND THEIR COMPONENTS IN ADVANCED ENGLISH AS A FOREIGN LANGUAGE LEARNERS

	Knowledge of cognition		Regulation of cognition		Metacognitive awareness	
	r	R^2	r	R^2	r	R^2
Fluency	0.28*	**0.07**	0.34**	**0.1**	0.34**	**0.1**
Elaboration	0.2	**0.04**	0.22	**0.04**	0.23	**0.05**
Originality	0.28*	**0.07**	0.17	**0.02**	0.22	**0.04**
Flexibility	0.15	**0.02**	0.19	**0.03**	0.18	**0.03**
Total creativity	0.31*	**0.09**	0.31*	**0.09**	0.33*	**0.1**

* P < 0.05
** P < 0.01

Table3.3. shows that knowledge of cognition correlates significantly with fluency (r = 0.28, R^2= 0.07, P<0.05), originality (r = 0.28, R^2= 0.07, P<0.05), and total creativity (r = 0.31, R^2= 0.09, P<0.05) in advanced EFL learners. The moderate effect sizes calculated confirmed the existence of a significant relationship between each pair. Regulation of cognition also had a significant relationship with fluency (r = 0.34, R^2= 0.1, P< 0.01) and total creativity (r = 0.31, R^2= 0.9, P< 0.05) with moderate effect sizes. As it was expected from the positive correlation between fluency and both components of metacognitive awareness, a significant relationship was found between fluency and total metacognitive awareness (r = 0.34, R^2= 0.1, P< 0.01).

Taking into account the above results, it can be stated that there is a significant correlation between metacognitive awareness and creativity in the advanced EFL learners.

TABLE 3.4.
PEARSON CORRELATION ANALYSIS BETWEEN METACOGNITIVE AWARENESS, CREATIVITY, AND THEIR COMPONENTS IN BEGINNERS

	Knowledge of cognition		Regulation of cognition		Metacognitive awareness	
	r	R^2	r	R^2	r	R^2
Fluency	0.27*	**0.07**	0.34**	**0.1**	0.33*	**0.1**
Elaboration	0.16	**0.02**	0.2	**0.04**	0.19	**0.04**
Originality	0.25	**0.06**	0.37**	**0.1**	0.35**	**0.1**
Flexibility	0.18	**0.03**	0.21	**0.04**	0.21	**0.04**
Total creativity	0.26*	**0.07**	0.37**	**0.1**	0.35**	**0.1**

* P < 0.05
** P < 0.01

The analysis also revealed that knowledge of cognition correlated significantly with fluency (r = 0.27, R^2= 0.07, P<0.05), and total creativity (r = 0.26, R^2= 0.07, P<0.05) in beginners (table3.4.). The moderate effect sizes calculated confirmed the existence of a significant relationship between each pair. Regulation of cognition also had a significant relationship with fluency (r = 0.34, R^2= 0.1, P< 0.01), originality (r = 0.37, R^2= 0.1, P<0.01) and total creativity (r = 0.37, R^2= 0.1, P< 0.01) with moderate effect sizes. Therefore, the positive correlation between fluency and both components of metacognitive awareness, a significant relationship was found between fluency and total metacognitive awareness (r = 0.33, R^2= 0.1, P< 0.05). therefore, it can be concluded that in beginners also metacognitive awareness and creativity significantly correlate with each other.

IV. DISCUSSION

An earlier study conducted by Ghonsooly and Showqi (2012) examined creativity in two groups of beginners and advanced English as a foreign language learners and confirmed the superiority of the former. In pursuit of that study, the present paper assessed metacognitive awareness in the same participants. However, the results showed that mastering a foreign language in a classroom context has no effect on metacognitive awareness of females belonging to the age group of 16 to18.

In the scope of education, metacognitive awareness has been investigated for domain-specific purposes. For instance, concerning second language learning, researchers have examined the metacognitive strategies that learners employ in reading, writing, etc. These studies certainly are valuable in that they find ways to get through learners' minds and help them make use of their potentialities in more effective ways. However, a question that was raised in this study concerned the impact of enhanced domain-specific metacognitive awareness on the general metacognitive capacity of the learners. Since metalinguistic awareness is partially considered as the domain-specific form of metacognitive awareness for language learners, and the evidence from previous studies suggested that bilinguals and foreign language learners have higher levels of metalinguistic awareness than beginners, the metacognitive awareness was assessed in advanced English as a foreign language learners and beginners. As opposed to our expectations, there was no significant difference between the two groups in their performance on the metacognitive awareness inventory.

One explanation for this finding can be the age of the participants. Kuhn and Dean (2004) strongly claimed that metacognition improves with age, and in everybody's course of life it moves through similar stages, that is, after the construction of tacit theories in childhood they take the form of elementary informal theories that are deemed to be domain-specific, later on they become more advanced in their level of formalization and will finally extend to other domains through practice and self-reflection (Schraw & Moshman, 1995). Given that, it can be speculated that the participants in this study have constructed tacit theories, and are currently in the stage of informal theory construction. It is possible that as they grow older and more skillful in employing their second language, this domain-specific knowledge would generalize to other domains.

The above finding is justifiable by considering the foreign language learning systems that the learners in this study had experienced. Currently, few if any institutes provide learners with formal metacognitive strategies; and in addition to the learners who cannot organize their knowledge of second language as efficiently as they should, even a large number of teachers are themselves unfamiliar with this concept. However, regarding the crucial role of metacognitive awareness not only in language learning and education but also in the whole lifespan, it is of great value to make teachers familiar with the concept of metacognition so that they can provide learners with useful metacognitive awareness strategies from the early stages of language learning, and make them autonomous learners. Of course, this kind of instruction requires careful considerations, extensive research, preparation and training; however, its facilitating effects on the learning process would be awesome.

The correlation analysis between creativity and metacognitive awareness asserted the significant relationship between the total creativity and total metacognitive awareness scores in both groups, i.e., beginners and advanced English as a foreign language learners. In other words, both components of metacognitive awareness- knowledge of cognition and regulation of cognition- significantly correlated with total creativity. Considering their subcomponents, in addition to the significant correlation that was observed between regulation of cognition and fluency, a strong relationship was found between knowledge of cognition and two subscales of creativity, i.e. fluency and originality in EFL learners. Regarding beginners, there was a significant correlation between knowledge of cognition and fluency. Moreover, regulation of cognition also correlated with fluency, originality and elaboration. In addition, there was a significant relationship between the total creativity and total metacognitive awareness scores in both groups.

V. Conclusion

The present study showed that although creativity, as a cognitive function is improved through foreign language learning, metacognitive awareness is not under its influence. As it was discussed in the previous section, this result can be attributed to different factors; however, it is of great significance to examine this function in other age groups, different levels of foreign language mastery and also among male learners.

Since one of the main components of second/foreign language mastery is deemed to be creative thinking, any attempt at improving this capacity is of great value. However, foreign language institutions have paid little attention to enhancing this aspect of cognition. One reason is that providing learners with creative tasks requires a great deal of effort and investment. Due to the fact that it is usually easier and less time-consuming for teachers to teach something directly in a class (metacognitive strategies) rather than try to bring about a subject indirectly or through complicated tasks such as those carefully designed to enhance creativity, we suggest that creativity can be improved through metacognitive awareness. Few if any teacher training courses have ever mentioned this concept, however, it is highly recommended because it can have a fixed framework which makes its teaching easier and takes less time than creative thinking tasks to be taught. Furthermore, regarding the individual differences between teachers in their ability to convey purely thought provoking tasks, introducing metacognitive awareness to the learners can lead to improvements in creative thinking ability.

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