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Presentation of a Causal Model of Relationships Between Metacognitive Beliefs, Need for Cognition, and Metacognitive Awareness: The Mediating Role of Goal Orientation and Self-Efficacy

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A B S T R A C T

Objective: Metacognitive beliefs have significant impacts on individual performance, and enhancing and altering these beliefs lead to meaningful changes in metacognitive awareness. The present study aims to present a causal model of the relationships between metacognitive beliefs, the need for cognition, and metacognitive awareness: exploring the mediating role of goal orientation and self-efficacy in the context of students taking a general English course at Payame Noor University, Fars Province, during the first semester of 2021.

Methods and Materials: This is an applied study using a descriptive correlational research design through path analysis. The statistical population includes all undergraduate students at Payame Noor University, Fars Province, who enrolled in a general English course in the first semester of 2021, totaling approximately 3,422 students. A sample of 480 students was selected using stratified random sampling based on Morgan's table. Data collection tools included the Bufora et al. (1998) goal orientation questionnaire, Wells' (1997) metacognitive beliefs questionnaire, Sherer and Maddux's (1997) self-efficacy scale, and the Cacioppo (1996) need for cognition questionnaire.

Findings: The current study indicates that the indices of the conceptual model's fit are in an acceptable condition. The four factors of metacognitive beliefs, need for cognition, goal orientation, and self-efficacy have a significant effect on students' metacognitive awareness. Among the internal variables, self-efficacy had the most substantial effect (0.19), and metacognitive beliefs had the least (0.164).

Conclusion: Overall, considering the goodness-of-fit indices and the overall examination of the model within the study group, the model exhibited appropriate fit and can be utilized in decision-making and policy-setting.

Keywords: *Metacognitive awareness, Metacognitive beliefs, Goal orientation, Self-efficacy.*

1. Introduction

The academic performance of students is regarded as one of the most important indicators of success in educational systems, influenced by several factors including teaching (Abdollahi et al., 2022; Alipio, 2021; Parsakia et al., 2022). In the past two years, with the advent of the COVID-19 virus, significant changes have occurred in teaching methods. However, education at universities, including Payame Noor universities, not only continued, but also embraced innovative educational methods, transforming limitations into learning opportunities. The use of modern teaching methods along with virtual education has opened a new page in education and teaching in universities for both professors and students. Previously, professors and students may have resisted electronic teaching, but with the onset of the COVID-19 virus, not only did it change lifestyles, but it also impacted teaching and learning approaches which did not decrease learning efficiency but were highly productive (Nugroho et al., 2020). The flipped classroom method has recently gained attention among educators. Specifically, its effective use in teaching English language has been particularly noted (Gelineau-Morel & Dilts, 2021).

When a learner experiences integrated flipped learning, they consciously experience learning in a combination of places, times, and technologies, seamlessly. Integrated flipped learning can provide a continuous learning experience in various environments such as home-school or workplace-university (Milrad et al., 2013). This education transforms traditional courses and helps guide students to use knowledge and achieve higher-level learning goals. May and colleagues believe (Mei et al., 2019) that in integrated flipped teaching, learners can review and assess their understanding of the subjects more with the help of a teacher or classmates. In this way, they can correct their misunderstandings, which significantly helps to enhance and improve student awareness. This encourages students to engage more student-centered knowledge (YelgeÇ & DaĞYar, 2022).

Because of the academic successes it has achieved, the flipped classroom has received significant scientific attention in higher education (Guo, 2019). A review of research indicated that approximately 80% of studies related to the flipped classroom conditions have been conducted at the higher education level (Akçayır & Akçayır, 2018). A flipped classroom (inverted or reversed classroom) refers to an educational approach that employs interactive and participatory learning activities inside the classroom and direct online instructions outside the classroom. Gong states: One of the integrated features of the flipped educational classroom is that it wants students and learning to be the center of attention, not the teacher or professor. Moreover, in a flipped classroom, students are likely to engage in meaningful activities to be responsible for their own learning, deeply process information, and achieve high-level learning (Gong et al., 2020). Much of the classroom time is spent on social interaction, peer collaboration, group discussions, and problem-solving, which leads to deep learning. Akcayir (2018) argued based on this autonomy theory: Participants who actively participate in a flipped classroom may be satisfactory for students who have a strong need for autonomy, independence, and competence, thus improving student learning motivation (Akçayır & Akçayır, 2018).

Flexibility is another advantage of the integrated flipped classroom often discussed by researchers. The use of self-taught video instructions allows students to learn anywhere and anytime, and they can pause, restart, review, or fast forward the video (Guo, 2019). As Gong (2020) wrote, this type of self-directed learning helps students increase their cognitive capacity and ease learning. It is believed that the integrated flipped classroom approach with self-directed and personalized learning is more suitable for students with various skill levels. Students with different levels of prior knowledge can receive personalized and appropriate scientific training and benefit from guidance in and out of the flipped classroom sessions (Gong et al., 2020). This can provide better management of cognitive capacity that is beneficial for learning.

In various studies, metacognitive awareness has been considered an important distributor for success in learning and an appropriate tool for integrated flipped learning. "The new science of learning" includes active and metacognitive learning (Milrad et al., 2013). This type of science is essential for student performance as it broadly affects the learning process. Students during active learning are able to control and manage their learning practices (Kissi et al., 2018). Metacognition is vital for the learning environment, as students can control their knowledge and learning process through it and wherever needed, modify and improve with new cognitive skills (YelgeÇ & DaĞYar, 2022). Metacognitive awareness requires students to reflect on what they know, care about, and are able to do, which not only helps learners expand their self-awareness but also provides valuable information for their education (Limueco &

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Prudente, 2019). Abdelrahman (2020) found that having extensive information is not a solution; what matters is the vast amount of information and its application in all areas of life (Abdelrahman, 2020); therefore, a concept is needed that helps the learner achieve higher levels of thinking and self-awareness and gain sufficient skill in cognitive processes and problem-solving that are manifestations of metacognition. Metacognition enables students to maintain their learning path and think (Milrad et al., 2013).

Numerous motivational and cognitive variables affect the improvement and enhancement of metacognitive awareness, which were examined in this research; self-efficacy, goal orientation, metacognitive beliefs, and the need for cognition were reviewed. Metacognitive awareness has been considered an important distributor for success in learning. One of the influential variables on metacognitive awareness is goal orientation. The desire to expand oneself by acquiring new skills, mastering new situations, and enhancing personal skills and avoiding judgment about it is defined (Zhou & Wang, 2019).

Another influential variable is self-efficacy, which today has a high status in various aspects of healthy life (Abdelrahman, 2020). Self-efficacy refers to an individual's belief in their abilities and plays an important role in human progress. Self-efficacy is a deep and internal judgment of an individual about themselves and their abilities and capabilities to achieve a specific level of performance or an individual's evaluation and perception of themselves in terms of efficiency and capabilities (Ben-Naim et al., 2019). Another influential variable in this research is metacognitive beliefs. Beliefs that a person has about their cognitive resources in a domain, how well they perform in that domain, the strategies and exploratory methods they can use, and the nature of that domain of knowledge (Dehghani & Hekmatiyan Fard, 2020). Beliefs, through the use of metacognitive awareness strategies, have significant impacts on individual performance. Multiple studies have shown that strengthening and changing metacognitive beliefs lead to significant changes in metacognitive awareness (Hassani & Livarjani 2017).

The last influential variable, the need for cognition, is considered as a general and relatively stable internal motivational trait. Individuals with a high need for cognition internally invest their cognitive resources in thinking and actively lean toward situations that are cognitively challenging (Prabhu et al., 2008). Individuals with a high need for cognition determine how people invest their cognitive resources and how they behave in the face of cognitively challenging content, for example, individuals with a high need for cognition are more inclined to engage in and enjoy metacognitive strategies (Dehghani & Hekmatiyan Fard, 2020).

The necessity of conducting the current research is twofold. On one hand, with the widespread presence of information technologies in the field of education and on the other hand, the emphasis on education everywhere and all the time, the necessity to pay attention to integrated flipped learning was felt (Gong et al., 2020). Considering that extensive research has been done in the field of flipped learning in English language courses, but so far no research has been conducted in the field of integrated flipped learning in English language courses, hence the necessity of conducting this research was felt. What differentiates this research from other studies is the use of one of the modern teaching methods, integrated flipped teaching, which in the 21st century has become the main part of teaching in universities (Limueco & Prudente, 2019).

Given the results and reports, the main issue in this research is to examine and clarify the relationships between the need for cognition, metacognitive beliefs, and metacognitive awareness with the mediating role of goal orientation and self-efficacy among students at Payame Noor University of Fars. The best method to describe the relationship between a set of interconnected variables is through the means of a causal path model. Based on the research conducted, the main goal of this research was to present a causal model of relationships between metacognitive beliefs, the need for cognition, and metacognitive awareness: the mediating role of goal orientation and self-efficacy.

2. Methods and Materials

2.1. Study Design and Participants

This study is applied in terms of its goal and descriptive correlational in nature and method, based on a model presentation. The population consists of all undergraduate students at Payame Noor University in Fars province who took a general language unit as part of their coursework in the first half of the year 2021, totaling approximately 3422 students. A sample of 480 individuals was selected through stratified random sampling according to Morgan's table. Data for testing the research hypotheses were collected using questionnaires on metacognitive awareness, goal orientation, need for cognition, metacognitive beliefs, and self-efficacy.

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2.2. Measures

2.2.1. Metacognitive Awareness

Metacognitive Awareness Inventory by Mokhtari and Richard (2018) consists of 30 items scored on a Likert scale from always (score 5) to never (score 1). It includes components (general reading strategies, problem-solving strategies, reading support strategies) and has a reliability of 0.87 (Kooshki & Shavandi, 2019).

2.2.2. Goal Orientation

Goal Orientation by Bouffard and colleagues (1998) has 20 items scored on a Likert scale from 1 (never) to 5 (always). It includes components (mastery-oriented, performance-oriented, and performance-avoidant) and has a reliability of 0.81 (Rezapour Mirsaleh & Shakeri, 2018; Safarzadeh & Mareshian, 2016; Zhou & Wang, 2019).

2.2.3. Metacognitive Beliefs

Metacognitive Beliefs Questionnaire by Wells (1997) has 30 items scored on a Likert scale from 1 (disagree) to 4 (strongly agree). It includes components (positive beliefs about worry, cognitive confidence, cognitive self-consciousness, negative beliefs about uncontrollability of thoughts and danger, and beliefs about the need to control thoughts) and has a reliability of 0.78 (Dehghani & Hekmatiyan Fard, 2020; Hayati et al., 2020).

2.2.4. Self-efficacy

General Self-efficacy Questionnaire by Sherer and Maddox (1997) has 17 items scored on a Likert scale from 1 (never) to 5 (always). It includes components (aptitude, effort, context) and has a reliability of 0.83 (Sherer & Adams, 1983; Zainallypour et al., 2009).

2.2.5. Need for Cognition

Need for Cognition Scale by Cacioppo (1996) is an 18-item self-report scale scored on a Likert scale from 1 (never) to 5 (always), with a reliability of 0.83 (Akpur, 2017; Al-Hamouri & Abu Mokh, 2011).

2.3. Data analysis

Although the questionnaires are standardized, they have been validated for cultural equivalence and content by a group of university professors, and their content validity was confirmed after their feedback. Additionally, construct validity was assessed using confirmatory factor analysis with AMOS software. The results of the confirmatory factor analysis show that the factor loadings for all questionnaire items are above 0.50 and the corresponding t-values are 1.66, indicating the construct validity of the questionnaires. Cronbach's alpha values for the constructs of the research (final reliability) are 0.87 for the Metacognitive Awareness Questionnaire, 0.81 for the Goal Orientation Questionnaire, 0.83 for the Need for Cognition Questionnaire, 0.78 for the Metacognitive Beliefs Questionnaire, and 0.83 for the Self-Efficacy Questionnaire. The results indicate that the research model is well-fitted, which shows the appropriateness of the questionnaires' reliability statistically. Path analysis using AMOS software was finally used to examine the relationships between research variables.

3. Findings and Results

Regarding demographic characteristics, the sample consisted of 315 males (65%) and 165 females (35%). 66 students (14%) were from basic sciences, 119 students (24%) from arts, and 295 students (62%) from humanities. Also, 300 participants (62%) were aged between 18 and 22 years, and 180 participants (38%) were aged between 22 and 26 years.

Table 1

Means and Standard Deviations of Research Variables

Variables	Mean	Standard Deviation
Metacognitive Beliefs	4.14	4.555
Need for Cognition	3.19	3.010
Self-efficacy	4.74	3.142
Goal Orientation	4.10	4.980
Metacognitive Awareness	3.22	3.980

Based on the results from Table 1, the highest mean corresponds to the variable Self-efficacy (4.74), and the lowest to Need for Cognition (3.19). Table 2 presents the correlation matrix of the variables.

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Table 2

Correlation Matrix of Research Variables

Variables	1	2	3	4	5
Metacognitive Beliefs	1				
Need for Cognition	0.192**	1			
Self-efficacy	0.378**	0.380**	1		
Goal Orientation	0.218**	0.416**	0.341**	1	
Metacognitive Awareness	0.252**	0.341**	0.330**	0.400**	1

**p<0.01

The results from Table 2 showed that in the correlation matrix of the variables among Payame Noor University students, goal orientation had the highest correlation (0.400) with metacognitive awareness, while metacognitive beliefs had the lowest (0.252).

Table 3

Estimates of Direct and Indirect Effects

Variable Estimates	Standardized Direct Effect Estimates	T	Standardized Indirect Effect Estimates	T
Direct Effect of Need for Cognition on Goal Orientation	0.260***	5.33		
Self-efficacy	0.283***	6.25		
Metacognitive Awareness	0.173***	3.45	0.103	1.49
Direct Effect of Metacognitive Beliefs on Goal Orientation	0.222***	4.41		
Self-efficacy	0.382***	4.48		
Metacognitive Awareness	0.130**	2.51	0.119**	2.23
Direct Effect of Self-efficacy on Goal Orientation	0.160**	3.06		
Direct Effect of Goal Orientation on Metacognitive Awareness	0.164**	3.18		
Direct Effect of Self-efficacy on Metacognitive Awareness	0.190***	3.57	0.026	1.12

***p < .0001, **p < .01

According to the direct effect coefficients in Table 3 and the conceptual model of the research in Payame Noor University students, all direct effects of the variables on metacognitive awareness were significant.

Table 4

Fit Indices for the Model Predicting Metacognitive Awareness

Fit Index	Estimate
Chi-Square/df (x2/df)	3.53
Comparative Fit Index (CFI)	0.94
Goodness-of-Fit Index (GFI)	0.98
Adjusted Goodness-of-Fit Index (AGFI)	0.91
Root Mean Square Error of Approximation (RMSEA)	0.02

According to the fit indices in Table 4, the model predicting factors affecting metacognitive awareness among Payame Noor University students is at a very acceptable level. Next, we present the final output model and adjusted conceptual model with path coefficients among Payame Noor University students in Shiraz.

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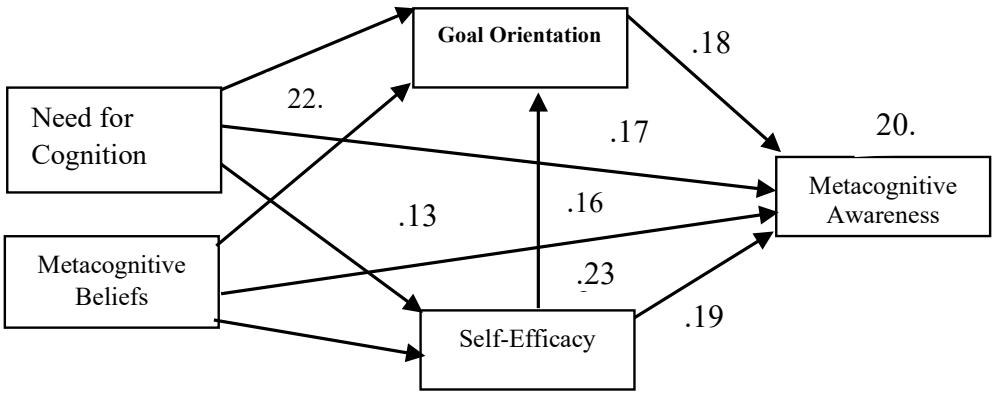
Figure 1

Model with Beta Coefficients



4. Discussion and Conclusion

The primary aim of this study was to present a causal model and examine the relationships between the need for cognition, metacognitive beliefs, and metacognitive awareness, with the mediating role of goal orientation and self-efficacy. In evaluating the conceptual model of the research and considering the fit indices as well as reviewing the overall model in the study group, the model was found to have suitable fit indices and can be utilized in decision-making and policy-setting in line with the existing theoretical and empirical foundations. One of the most significant findings of this research is the direct impact of the need for cognition on goal orientation, self-efficacy, and metacognitive awareness, which aligns with the prior research (Al-Hamouri & Abu Mokh, 2011), demonstrating that the need for cognition predicts self-efficacy and metacognitive awareness of professors, and a significant positive relationship exists between them.

In explaining this finding, it can be stated that students with a higher need for cognition are more likely to possess metacognitive awareness. Also, the significant effect of the need for cognition on goal orientation sends a message to educational authorities that the school environment and educational settings should be arranged in a way that enhances the independence and competence of students. The indirect effect of the need for cognition on metacognitive awareness through the mediation of goal orientation and self-efficacy was not significant, which aligns with the research by Kooshki (2019) (Kooshki & Shavandi, 2019), but is inconsistent with the study by Keshavarz et al. (2016; 2017) (Keshavarzi et al., 2017; Keshavarzi et al., 2016). Metacognition involves both cognitive processes and the cognitive regulation of emotions, as well as mindfulness. Moreover, the results showed that the direct effects of metacognitive beliefs on goal orientation, self-efficacy, and metacognitive awareness are significant. Since goal orientation is one of the motivational variables related to metacognition, this finding was not unexpected as stated by Abdelrahman (2020), who noted a significant relationship between performance-avoidant goals and metacognition, which is in line with our study (Abdelrahman, 2020).

It can be said that students who use high-level metacognitive strategies learn significantly, leading to a deeper understanding of the information, retaining the material for a longer period, and being more successful in exams, ultimately reaching higher awareness. Another finding of this research is the direct impact of self-efficacy on goal orientation. In other words, students who had a goal orientation also possessed high self-efficacy (Siqueira, 2021). Another result of this study is the direct impact of goal orientation on metacognitive awareness. This finding is consistent with the research by Akpur (2017), derived from the fact that mastery-oriented individuals are after genuine understanding and learning (Akpur, 2017). Therefore, in order to achieve their goals, they require more cognitive effort and need to use metacognitive skills consciously or subconsciously to regulate and optimally utilize their cognitions and learnings. Consequently, such individuals are sensitive about their learning, set goals for themselves to enhance their learning, and seek better methods to improve their cognitive abilities, reflecting a concern in performing metacognitive activities.

Given the various research outcomes, metacognition and metacognitive awareness play a very important role in the

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learning process. Another result of this study showed that the direct effect of self-efficacy on metacognitive awareness was significant. This finding aligns with the research by Kissi et al. (2018), which confirmed the impact of self-efficacy on metacognitive awareness (Kissi et al., 2018). It is expected that when an individual's awareness of the content of learning strategies is high and they can easily recognize the appropriate situation to apply them, their perception of competence and confidence in correctly resolving challenges will increase.

Overall, within the variables of the causal model, we conclude that individuals with high self-efficacy are more inclined to use their self-regulatory cognitive strategies, including metacognitive awareness. Mastery-oriented individuals aim for real understanding and learning; thus, they require more cognitive effort to achieve their goals and use metacognitive skills to consciously or unconsciously regulate and optimize their cognitions and learnings. Therefore, such individuals are sensitive about their learning, set goals to better and increase their learning, and seek better methods to enhance their cognitive abilities, reflecting a concern in performing metacognitive activities. As a result, the more self-efficacy and goal orientation are enhanced in students, the greater their metacognitive awareness becomes, and we have witnessed the use of metacognitive awareness and the provision of suitable results in this educational system. Further research is necessary and essential to confirm these findings and to educate committed and literate students.

5. Limitations & Suggestions

Among the limitations of this research, it can be noted that it was conducted solely using quantitative methods, and the sample was limited to a specific region. Additionally, respondents may not have answered the questionnaire items with sufficient accuracy, which could impact the results. Few variables were used, and it is suggested that future research should measure other variables related to metacognitive awareness. Planners of higher education systems should be able to strengthen self-efficacy and goal orientation in students as this enhances their metacognitive awareness.

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Declaration

In order to correct and improve the academic writing of our paper, we have used the language model ChatGPT.

Declaration of Interest

The authors of this article declared no conflict of interest.

Ethics Considerations

The study protocol adhered to the principles outlined in the Helsinki Declaration, which provides guidelines for ethical research involving human participants.

Transparency of Data

In accordance with the principles of transparency and open research, we declare that all data and materials used in this study are available upon request.

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Authors' Contributions

All authors contributed equally.

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