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Research Paper

Proposing a Causal Model to Predict Self-regulated Online Learning Based on Metacognition—Mediated by Online Learning Readiness: A Path Analysis

Nooshafarin Safari [*1], Mahmoud Ekrami [2], Hossein Hafezi [3], Ahmad Karimi Dashtaki [3]

1. Corresponding Author: Ph.D. student, Distance Educational Planning, Department of Educational Sciences, Payame Noor University, Tehran, Iran
2. Associate professor, Educational Sciences, Payame Noor University, Tehran, Iran
3. Assistant professor, Educational Sciences, Payame Noor University, Tehran, Iran

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Abstract

Aim: This study aimed to propose a causal model to predict self-regulated online learning based on metacognition mediated by online learning readiness. The participants were 350 students of online courses in the academic year 2020-2021 selected by cluster random sampling. The data collection instruments were the Group Metacognitive Scale (GMS), the Online Learning Readiness Scale (OLRS), and the Self-regulated Online Learning Questionnaire. The proposed model was evaluated in Amos software. The results showed that the data fit the research model. Metacognition positively predicted online learning readiness and self-regulated online learning. Online learning readiness significantly and positively predicted self-regulated online learning. Metacognition through online learning readiness significantly predicted all aspects of self-regulated online learning. Therefore, increasing online learning readiness and, consequently, metacognition can improve the level of self-regulated online learning in students of online courses.

Keywords*: self-regulated online learning; metacognition; online learning readiness; online courses*

Introduction

With the expansion of online distance learning, the interest in self-regulated learning has also risen (Boekaerts, Pintric, & Zeidner, 2000). Self-regulated learning is an active and organized process whereby learners set their learning goals and then try to regulate and control their cognition, motivation, and behavior (Flanigan, 2014). Researchers have recently focused on metacognition and readiness for online learning courses. Metacognition refers to the ability to perceive and develop an awareness of one's cognitive processes and control these processes to make the most of learning activities (Michele Biasutti, Sara Frate, 2018). Online learning readiness involves three dimensions: students' ease of use of electronic communications for learning, competency and self-confidence in computer-based communication, and ability to engage in independent learning (Min-Ling Hung, Chien Chou, Chao-Hsiu Chen, Zang-Yuan Own, 2010). Some studies have reported the relationship of metacognition with online learning readiness and self-regulated online learning, as well as the relationship between online learning readiness and self-regulated online learning (Moghaddam, 2019; Melissa Ng Lee Yen, 2020; Kirkic et al., 2020). Previous research, however, has not examined the mediating role of online learning readiness in the relationship between metacognition and self-regulated online learning. The present study, therefore, examined four hypotheses: (1) The direct effect of metacognition on online learning readiness is positive and significant; (2) the direct effect of metacognition on self-regulated online learning is positive and significant; (3) the direct effect of online learning readiness on self-regulated online learning is positive and significant, and (4) the indirect effect of metacognition on self-regulated online learning mediated by online learning readiness is positive and significant.

Method

The present applied and correlational (descriptive-cross-sectional) study used structural equation modeling (SEM). Metacognition was regarded as an independent exogenous variable, online learning readiness as a mediating variable, and self-regulated learning as the main endogenous dependent variable. The statistical population comprised all students of online courses in Iranian universities in the academic year 2020-2021. Given that there were 14 parameters observed in the present study, a ratio of approximately 25:1 was used to determine the sample size. Thus, a sample of 350 was selected considering the risk of attrition, incomplete questionnaires, and

outliers (Delavar, 2016). The instruments were the Group Metacognitive Scale (GMS), The Online Learning Readiness Scale (OLRS), and the Self-regulated Online Learning Questionnaire. The content validity of the questionnaires was qualitatively reported based on the opinion of phsycology and education experts of Payame Noor University. The reliability of the questionnaires using Cronbach's alpha is as follows: for metacognition and the subscales of *knowledge of cognition*, *planning*, *monitoring*, and *evaluation*: respectively 0.85, 0.88, 0.80, 0.83, and 0.89; for online learning readiness and subscales of *self-regulated learning, motivation for learning, computer/Internet self-efficacy, learner control*, and *online communication self-efficacy*: respectively 0.80, 0.79, 0.90, 0.91, 0.88, and 0.94; for self-regulated online learning and the subscales of self-efficacy for interaction with instructors, self-efficacy for contributing to the online community, enjoyment of human interaction, concern for interaction with students, writing strategies, responding strategies, and reflection strategies: respectively 0.85, 0.80, 0.90, 0.94, 0.79,0.87 and 0.93. These values indicate the acceptable reliability of the questionnaires. Descriptive (mean, standard deviation, and Pearson's correlation) and inferential (SEM) statistical methods were used to analyze the data.

Results

The structural model, paths, and standard coefficients of the variables showed that β and P coefficients were 0.14 and 0.03, respectively, for the path from metacognition to self-regulated online learning; 0.54 and 0.001, respectively, for the path from online learning readiness to self-regulated online learning; and 0.35 and 0.001, respectively, for the path from metacognition to online learning readiness. Based on the standard parameter coefficients and the corresponding probability values, all the paths of the final model were significant. Therefore, there is a direct, positive, and significant correlation between metacognition and self-regulated online learning ($P \leq 0.05$, $\beta = 0.14$). There is also a direct, positive, and significant correlation between metacognition and online learning readiness ($P \leq 0.01$, $\beta = 0.35$). The direct correlation between online learning readiness and self-regulated online learning is also positive and significant ($P \leq 0.01$, $\beta = 0.54$). The results of the mediation test (bootstrapping method) for the path from metacognition to self-regulated online learning mediated by online learning readiness showed $\beta = 0.27$ and $P = 0.001$ for the general correlation coefficient, $\beta = 0.19$ and $P = 0.01$ for the indirect correlation, and $\beta = 0.14$ and $P = 0.03$ for the direct correlation. These values suggest a weak

mediating role for online learning readiness in the path from metacognition to online self-direction learning. Thus, the general correlation between the predictor variable and the criterion was first determined without the mediator. The results demonstrated that there is a significant correlation between metacognition and self-regulated online learning without the mediator. On the indirect path, with the mediator, the correlation between metacognition and self-regulated online learning was still significant. This means that online learning readiness partly absorbs the correlation between metacognition and self-regulated online learning and slightly mediates it.

Discussion and conclusion

The direct effect of metacognition on self-regulated online learning was consistent with the literature (Kareshki and Garavand, 2012; Salarifar and Pakdaman, 2012; Melissa, 2020, Kirkic et al., 2020). The direct effect of metacognition on online learning readiness is also consistent with previous studies (Moghaddam, 2019, Greene et al., 2019), and the significant and direct effect of online learning readiness on self-regulated online learning is in line with the literature (Kazemi and Omidi Najafabadi, 2012)**.** The indirect effect of metacognition on self-regulated online learning mediated by online learning readiness is also significant. Given the growing importance of online education, senior managers and officials should facilitate the use of this model. Since the sample of the present study was selected only from the target population, local and cultural factors may have been at play; thus, caution should be exercised in generalizing the results to other statistical populations**.**

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