Chapter 7

Exploring Affective and Cognitive Measurements in Global Online Learning

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ABSTRACT

The chapter tries to identify cognitive and affective factors that affect learners' online learning. Based on a comprehensive review of the theories and frameworks, constructs related to cognitive and affective performance were identified which further serve as the bases for the development of two instruments: cognitive measurement in online learning and affective measurement in online learning. The endeavor is significant at both theoretical and practical levels. Theoretically, the chapter contributes to the understanding of the factors (cognitive and affective) that affect online learning by revealing the underlying constructs in online environment. Practically, it provides educators with the instruments that can be used to measure cognitive and affective aspects in online learning. Finally, the recommendations are made in relation to the use of the instruments.

1. INTRODUCTION

At the dawn of the second decade of the 21st century, the world witnesses a sweeping impact of pandemic that has affected and is affecting, as of the writing of this chapter, every aspect of societal life and activities globally. Taking from an international perspective, this pandemic has rendered the business, government, recreation,

education, etc. less functional resulting in serious consequences, particularly in education where lockdowns have led to a rapid degradation of the quality in students' learning with an increasing number of students failing the schools (Wong, 2020). Additionally, there is a significant change in the landscape of educational pedagogy global-wide, with educational institutions (K-16) resorting to the mode of distance/ online learning as its main source of content delivery. While online learning has been around for over two decades and is applied to various trainings across the domains (Bruce & Zheng, 2011; Zheng & Ferris, 2008), issues associated with the online learning have become more prominent as it is, in many situations during the pandemic, the sole source of education for students and teachers.

1.1 Affective and Cognitive States in Online learning

Research indicates that the effectiveness of online learning can be affected by individual differences (Khamparia & Pandey, 2020), instructional design (Zheng & Ferris, 2008), instructional strategies (Holbeck & Hartman, 2018), and measurement (Wright & Osler, 2020). Studies have demonstrated students' performance in online learning is related to their affective and cognitive states. Affective state refers to learners' motivation, locus of interest and self-efficacy play key roles in learning. Heo and Han (2018) find a positive correlation between learners' affective state (e.g., motivation, interest, etc.) and their online performance, "online students … are positively motivated by high attention for their online learning" (p. 67) and thus conclude that the affective state can significantly influence the direction and trajectory of learning progress in online environment. Besides affective state, online learning performance is indexed by its cognitive state of the learners. Cognitive state is defined by learners' abilities to process information, engage in deep learning and critical thinking, as well as the constraints associated with cognitive processes. The associated constraints may include the availability of cognitive resources in working memory (Zheng & Gardner, 2020), the amount of mental load, also known as cognitive load during the learning (Zheng, Miller, Snelbecker, & Cohen, 2006), and the differences in cognitive styles in processing the subject content (Zheng, Flygare, & Dahl, 2009). Costley (2020) highlights the importance of cognitive state in learning by claiming students' cognitive abilities play a key role in thinking critically about what they learn while transitioning from face-to-face to online learning during the pandemic period.

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