

## Chapter 40

# Effect of Online–Based Concept Map on Student Engagement and Learning Outcome

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### ABSTRACT

*One of the success factors in online learning is student engagement. Therefore, the use of technology to influence student engagement in meaningful and effective learning experiences is worthy for investigation. Concept mapping is an effective knowledge construction strategy to help students. This study investigates the influence of concept maps as a formative assessment of online learning and its impact on student engagement and learning outcomes. The design of experiment used the non-equivalent comparison group pretest-posttest. It was included in the quasi-experiment to compare two different groups. The results reveal strong evidence that concept mapping not only improves learning outcomes, but also increases student engagement in all types of tested engagements, namely behavioral, emotional, and cognitive.*

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## **INTRODUCTION**

The development of web and internet technology has an impact on the increasing use of online learning and has become one of the predominate approaches to learning today. Online learning as a form of distance education offers students a greater extent of freedom in how and when they interact in the virtual classroom context. However, online learning is fundamentally different from the traditional classroom, that is students are separated from their instructor by a computer screen (Ni, 2013). Therefore, the problem that often occurs is the lack of student engagement in learning. The main failure of students that often occurs when participating in online learning is due to a lack of consistency and student engagement (Jordan, 2014; Cohen, 2017). In fact, time and frequency of student engagement in accessing the learning environment is one of the success factors in achieving results in online learning (Song, Rice, & Oh, 2019). In addition, factors that also influence are the availability of computer equipment, online learning readiness, and user-friendly systems (Barclay, Donalds, & Osei-Bryson, 2018). Thus, increasing student engagement in online learning is today's challenge.

Student engagement in the learning process has drawn a great deal of attention from researchers in the educational setting. Currently, many technologies have been implemented in online learning to support students as a means of increasing their engagement, retention, and understanding. Student engagement consists of several constructs, namely behavioral, emotional, and cognitive. The fusion of these three sub-constructs in reality is dynamically interrelated within the individual (Fredricks, Blumenfeld, & Paris, 2004). This includes behavioral engagement in the form of students' attention and effort in participating in the learning process, being directly involved with learning objects, having courage in asking questions in public, and spending time accessing learning resources. Moreover, cognitive engagement includes focus, elaboration, explanation, self-regulated interest, and psychological investment in learning. Meanwhile, anxiety, boredom, happiness, interest, passion, and interaction between students are representations of emotional engagement (Henrie, Halverson, & Graham, 2015).

In order to increase student engagement in online learning, a strategy where the instructor's duty is to position students as active learners in which students are given the opportunity to construct their own knowledge is required. This is in line with Glaserfeld (1996) who states that learning is constructive activity. One of the constructive activities is organizing knowledge. Concept mapping is known as an effective knowledge construction strategy to help students organize important concepts related to the core issue of a domain in science and its relationship between other concepts (Hwang, Kuo, Chen, & Ho, 2014). Concept maps also identify the way the students think, and the manner in which they view relationships between their knowledge as well. By constructing concept maps, students become actively involved in identifying central ideas and connecting them with each other in more meaningful ways (Heinze-Fry & Novak, 1990; Novak, 1990). Concept maps have proven efficiencies in enabling students to link knowledge domains and to memorize the information better (Novak, 2010). It helps to integrate concepts and also eventually enhances their interests in learning (Chiou, 2008). In addition, an individual's ability to construct concept maps also illustrates ideas of representation and organization (Hwang, Chen, Sung, & Lin, 2018). The theoretical reason for the use of concept maps in learning is that it allows students to collect key elements of the information they read and then connect them to a coherent structure (Fiorella & Mayer, 2015).

Undoubtedly, most of the studies that have been conducted confirm the effectiveness of concept maps in helping students organize and understand the concepts of learning material. Further studies confirm that involving students in constructing concept maps is more beneficial for them than using concept

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