

# Chapter IV

## The Influence of Constructivist E-Learning System on Student Learning Outcomes

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### **ABSTRACT**

*In this article, the study of how a constructivist e-learning system affects students' learning outcomes was explored and a two-phase study was designed. The first study sought to create a constructivist e-learning environment (CEE) and discover how students expected their learning outcomes under CEE. CEE is composed of three constructs, which are exploration, collaboration, and construction. The statistical results showed the high level of student expectation on every construct. Consequently, constructivist e-learning system (CES) was developed. In the second study, CES was used in the actual classroom environment. The purpose was to compare the learning outcomes and knowledge development of students who studied the course using CES with those of students who learned it under a traditional learning environment. A T-test method was used to analyze the learning outcomes. The results showed that students who used CES had better learning outcomes and knowledge development than students who did not use CES.*

## **INTRODUCTION**

E-learning refers to an alternative method of teaching and learning using all electronic media, including the Internet, network, audio/video tape, and CD-ROM. For the past few years, the use of e-learning to conduct teaching and learning in educational institutes has rapidly increased along with the development of information technology. E-learning has an advantage of enabling students to learn from anywhere and at anytime. E-learning also provides a one-stop service for teachers and learners in order to create and deliver educational content quickly, effectively, and economically (Ong, Lai, & Wang, 2004).

In the past, e-learning researches have focused more on learning objects. The IEEE Learning Technology Standards Committee defines learning objects as “any entity, digital or non-digital, which can be used, re-used or referenced during technology-supported learning” (Shepherd, 2006). However, students may not improve learning outcomes by using only learning objects. Recently, the focus of e-learning has shifted from defining, sharing, and reusing learning objects to emphasizing learning activities based on the concept of learning design, which emerges as one of the most significant recent developments in e-learning (Yu, Zhang, & Chen, 2006). The key principle in learning design is to develop learning activities that are performed by different learners in the context of learning (Koper, 2006). The objective of learning design is also to assist students to effectively learn by creating and managing their learning processes (Pan & Hawryszkiewicz, 2004).

Regarding learning design, e-learning has blended with learning theory in order to try to improve learning outcomes. The learning methods, such as independent learning, active learning, self-directed learning, problem-based education, simulations, and work-based learning are based on constructivist learning theory (Reiser, 2001).

The e-learning design in this study, therefore, is based on constructivist learning theory.

This study was divided into two phases. The first phase was to create constructivist e-learning environment (CEE) and to explore the expected student e-learning outcomes on CEE. The objective of this step was to investigate what learning outcomes students might expect by using a statistical method. Consequently, based on CEE, the constructivist e-learning system (CES) was developed. The second phase was designed as an experimental research that focused on the comparison of actual student e-learning outcomes. The CES was used in the classroom environment. The student learning outcomes between students in traditional classroom environment and constructivist e-learning environment were compared. The statistical method (t-test) was also conducted to test the significance in this study.

## **REVIEW OF LITERATURE**

### **Constructivist Learning Theory**

The constructivist learning theory has emerged as a prominent approach to teaching during the past decade. The research of Dewey, Piaget, Vygotsky, and Jonassen, among others, provides historical precedents for constructivist learning theory. Constructivist learning theory represents a paradigm shift from education based on behaviorist theory to education based on cognitive theory. In a constructivist learning environment, students have better learning outcomes than in traditional learning environment (Parker & Becker, 2003, Tynjala, 1999).

Among many definitions of constructivist learning theory, the most common characteristic is that they all focus on activities and environments rather than on learning objects. Knowledge is constructed by learners and not transmitted by an instructor. Dewey (1938) believes that knowledge

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