Chapter 19

Perceptions of Competencies Developed in an Active Learning Course Featuring the Design of Web–Based Instruction on Mathematics

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ABSTRACT

This chapter presents a research study on mathematics education pre-service teachers' perceptions of competencies developed in an active learning course. During the course, the pre-service teachers designed web-based instruction (WBI) to teach mathematics to a targeted group of children. Data were collected through a demographic questionnaire, unstructured focus group interviews, open-ended questionnaires, and WBI design documents. WBI documents were analyzed according to Khan's (1997) identified components. The results of the study showed that, according to the mathematics education pre-service teachers, their internet search skills, content knowledge about distance education, web interface design skills, and technological knowledge increased or improved due to the WBI project. Moreover, participants observed how the constructivist philosophy did not apply to their designs. In addition, their designs were created from the perspectives of users rather than producers, as many components of WBI were not taken into account during or after the project.

INTRODUCTION

Web-based instruction has been described as the new center of educational policies because, as Moe and Blodget (2000) have stated, by 2025, about 40 million people will have participated in an online course. Sancar Tokmak (2013) has identified reasons for this increase in use as de-

mand for higher education and lifelong learning as well as advancements in technology, making WBI attractive for people all over the world. Khan (1997) described WBI:

Web-based instruction (WBI) is a hypermedia-based instructional program which utilizes the attributes and resources of the World Wide Web to create a meaningful learning environment where learning is fostered and supported. (p. 6)

Khan (1997) has categorized the components of WBI as content development, multimedia components, internet tools, computers and storage devices, connections and service providers, authoring programs, servers, browsers, and other applications. Hedberg, Brown, and Arrighi (1997) have emphasized that while the roles of teachers and students cannot be equated during traditional learning, roles can change in WBI. They distinguish the modes of teaching in this environment as user or producer. As users, teaching includes the use of interactive multimedia (IMM) and WBI tools; as producers, teaching includes IMM and Web page construction (Hedberg, Brown, & Arrighi, 1997).

However, the success of instruction offered online depends on the instructional design, not the medium. Ozonur (2013) compared two groups of learners who attended courses offered by Adobe Connect Pro and Secondlife Environment, where the applied instructional design was stable for both. According to the results, there was no significant difference between the two groups of learners' success rates. Bostock (1997) has stated that active learning can be an alternative that allows learners to construct their knowledge and that only placing content on a page cannot support active learning. The literature has showed that educators who offer online courses should enhance their design competencies by considering characteristics of online education and active learning. Accordingly, the main research question of the study was, what are mathematics education pre-service teachers'

perceptions of competencies developed in a WBI design activity structured for active learning?

ACTIVE LEARNING AND MATHEMATICS TEACHING

Generally defined as the implementation of any instructional method that engages students in the learning process, active learning requires students to conduct meaningful learning activities and think about what they are doing. Recently, national mathematics teaching programs and respected, internationally recognized mathematics teacher organizations such as National Council of Teachers of Mathematics (NCTM) have promoted the value of active learning in their processes.

The mathematics teaching program in Turkey has defined the general objectives and goals of mathematics education (MoNE, 2005) as seeking to provide students with

- An understanding of mathematical concepts and systems, their interrelationships, and the ability to apply these concepts and systems to daily life and in other academic subjects;
- Mathematics knowledge and skills for higher education;
- The ability to use deductive and inductive reasoning;
- The ability to use mathematical reasoning to solve problems;
- The ability to use correct terminology to explain mathematical processes;
- The ability to make efficient use of prediction and mental computation;
- The ability to develop problem solving strategies and apply them to real life situations;
- The ability to construct mathematical models;
- High self-esteem and positive attitudes toward mathematics;

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