
This study investigates how scaffolding can be implemented in a web-based learning environment to support language and self-directed learning. Specifically, this investigation demonstrates the multidimensional nature of scaffolding by using a design example of hard scaffolds developed for a web-based English learning site used by secondary schools. Unlike soft scaffolds, which are common in face-to-face classrooms, hard scaffolds are pre-designed before students study the content. This study illustrates how these hard scaffolds are embedded in an online English learning site for secondary school students. In this study, the scaffolds are categorized and subcategorized into types, levels, and modes. The findings of the pilot-tested web-based learning materials indicate that only well-planned and sophisticatedly designed scaffolds, such as an intelligent tutoring system, can facilitate student learning.

I. INTRODUCTION

In recent years, the Internet has become an increasingly popular tool for learning English among language learners. Unfortunately, the quality of many web-based English learning sites is questionable, and many fail to account for differences between the modes of web-based learning and traditional learning (Hammond, 2002; Kong, 2002; Li & Lim,* This research was supported by the Kyung Hee University Research Funding 2008.
Implementing the Concept of Scaffolding in an Online Learning Environment for EFL Learners

In an online learning environment, content is presented in a number of modes, including sound, video, animation, and graphics, whereas content in printed materials is comparatively limited. Moreover, the interactivity of online learning differs from that of face-to-face classroom environments, and therein, it is evident that students experience different cognitive and emotional processes during online learning.

Scaffolding is dramatically impacted by the mode of learning in cognition and emotion. The term scaffolding refers to instructional intervention and interactional support that facilitate cognitive and metacognitive processes during learning (Ge & Land, 2004; Kao, Lehman, & Cennamo, 1996). Several studies have demonstrated that scaffolding can cultivate self-directed learning, enhance student comprehension, and promote knowledge transfer (Cole, 2006; Coltman, 2000; Wells, 1999). In traditional classrooms, scaffolding refers to soft scaffolding through direct interactions, which are more dynamic and situation-specific, between teachers and students. In the online learning environment, scaffolding can be grouped into two basic categories. The first category involves scaffolding through human interactions during online learning. Students can use computer-mediated communication to learn from more knowledgeable resources within the learning community, such as content developers, teachers, and instructional designers. Even though this type of online interaction is mediated through computers and differs from face-to-face interaction, the participating individuals experience interpersonal interactions that are unpredictable, spontaneous, individual, and specific. Hard scaffolds are the second category of online scaffolding, and are static, meaning “anticipated and planned in advance based upon typical student difficulties with a task” (Brush & Saye, 2002, p. 3). In this way, the notions of scaffolding are implemented into the content during the development of online learning materials. Students have different cognitive and affective learning experiences in an online learning environment. Thus, content developers should consider the cognitive and affective differences and difficulties that students may experience while interacting with online learning materials.

Several studies have investigated the concept of scaffolding and its practice in traditional classrooms, while few have investigated its influence on student learning in online learning environments. Studies investigating online scaffolding have primarily focused on scaffolding through human interactions via Computer-Mediated Communication (CMC), that is, online soft scaffolds and not hard scaffolds (Ebenzer, Lugo & Puvirajah, 2003; Hara, Bonk & Angeli, 2000; Lee, 2005). Nevertheless, as web-based learning rapidly increases, effective implementations of hard scaffolds should be closely investigated since they greatly impact student learning (Kong, 2002; Sims, 2002). These researchers believe