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Knowledge building and the quantity, content and quality of the interaction and participation of students in an online collaborative learning environment

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ABSTRACT

The processes of knowledge building, the interaction and participation of students in an online collaborative learning environment and the relations among them are investigated. The investigation involved a procedure carried out over 14 weeks in an online collaborative learning environment. During the procedure, the knowledge building process was executed over Knowledge Forum and the planning process over Moodle LMS. The scaffolds, quantity, content and quality of interaction and participation, and relations between scaffolds and the quantity of interaction and participation were reviewed. The participants were 145 prospective teachers. In this research, a convergent parallel design method was employed. Data were collected from multiple sources, including the log records and the content analysis of Knowledge Forum postings. Development was observed in terms of the use of opinion building and expressing forms and note creation and build-on of the students in the knowledge building processes within the online collaborative learning environment. Furthermore, most of the academic content and the quality of interaction and participation were indicators of progress of the individual student and groups of students. There was a significant increase in the quality of interaction and participation from the beginning of the term to the end of term. It is suggested that the 14-week knowledge building process contributed to learning. It was found that there was a significant relation between the use of opinion building and expressing forms and the creation and build-on of notes by the students. Results show that the course offered in an online collaborative knowledge building environment contributed to opinion building and expression, the quantity, content and quality of interaction and participation, and thus the learning of students.

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1. Introduction

Previous studies on the effects of online collaborative learning environments on the cognition, comprehension and learning of students (Cacciamani, Donatella, Francesca, Tiziana, & Nobuko, 2012; So, Seah, & Heng, 2010; Stahl, Koschmann, & Suthers, 2006) have focused on the knowledge building skills of students. Knowledge building is a group activity in which knowledge is intentionally developed and students collaboratively work to solve, discuss, and compare common problems and detail their ideas (Scardamalia & Bereiter, 2003; 2006).

The aim of knowledge building is to create valuable knowledge structures as a group. Group members share their own opinions by means of structuring or expressing to create such structures (Garrison & Cleveland-Innes, 2005; Heo, Lim, & Kim, 2010). Additionally, shared opinions are examined and discussed by other group members. The value of these opinions is developed in a collaborative environment in which all group members share their cognitive responsibilities. In the process, opinions are put forth as a group in the context of literature and examples, and knowledge structures are created from existing opinions in the environment. The aim is thus for the created knowledge structures to contribute to the learning process. In that sense, there is a close relationship between learning and knowledge building. Hence, studies have stated that knowledge building is a process that contributes to learning and learning may be ensured by developing this process (Bereiter, 2002; Scardamalia, Bereiter, & Lamon, 1994; Scardamalia, 2004).

Environments that support the structuring and discussion of shared knowledge for the actualization of knowledge building are required. It has been suggested in the literature that online collaborative learning environments have been designed in accordance with this purpose and that these environments provide students more opportunities than the traditional classroom environment to participate in the knowledge building process (Lipponen, Rahikainen, Lallimo, & Hakkarainen, 2003; Noroozi, Weinberger, Biemans, Mulder, & Chizari, 2013; Stahl, 2006; Stahl, 2003). Primarily, interaction and participation in online collaborative learning environments should be ensured so that the knowledge building process is actualized (Bereiter & Scardamalia, 2003; Lipponen et al., 2003). Interaction and participation can be described as a process in which a mediator plays an important role between learners for the joint structuring of different opinions or common perspectives in the knowledge building process (Hong & Sullivan, 2009; Sing & Khine, 2006).

The purpose of the knowledge building process is to encourage students to read, criticize and develop the contributions of all members more in a discussion environment rather than by placing students into groups (Law, Yuen, Wong, & Leng, 2011). The ability to suggest different opinions in a collaborative and social way, to profoundly discuss these opinions and to develop the opinions by allowing for knowledge building can be considered difficult. This challenge entails the necessity of examining the relationship among interaction, participation and learning in online collaborative learning environments (Naranjo, Onrubia, & Segués, 2012). It is believed that knowledge building can be investigated in a multi-dimensional manner by considering interaction and participation together.

The literature on online collaborative learning environments focuses mainly on the quantity of interaction and participation, while there have been a limited number of analyses on the quality of interaction and participation. However, the quantity does not indicate quality, which cannot be addressed regardless of content. Hence, it has been recommended that database analysis tools that measure participation in online environments could be advanced in the direction of quality (Akçapınar & Aşkar, 2009). Additionally, the necessity of attaching importance to quality in this process has been emphasized (Abrami, Bernard, Bures, Borokhovski, & Tamim, 2011; Bernard, Abrami, Borokhovski, Wade, Tamim, Surkes et al., 2009; Chan & Chan, 2011; Naranjo et al., 2012). From this point of view, the present study focuses on the content, quantity and quality of interaction and participation in knowledge building processes occurring within online collaborative learning environments.

2. Theoretical framework

Knowledge building is related to constructivism. A student is allowed to create, structure, criticize and develop knowledge in constructivist education. Constructivism takes the form of an approach moving from the question of how students develop knowledge to how they structure it. It is suggested that constructivism involves knowledge transfer and restructuring by the student rather than the repetition or transfer of knowledge by someone else (Perkins, 1999). Knowledge building principles have been determined so that the knowledge building process can be structured accurately. The aim is to support opinion, suggesting that knowledge building is a constructivist approach, yet there are other aspects to knowledge building (Scardamalia, 2002).

One of the principles of knowledge building is epistemic agency, which was construed as the individual and collective responsibility for advancing individual and community knowledge (Russell, 2002; Scardamalia, 2002). The main objectives of the knowledge building process are to encourage students to read and criticize and also to generate greater contributions from all members in the discussion environment. Additionally, it is expected that students will respond not only within their own friend groups but to all group members and even other groups to which the students think they can contribute in discussion (Law et al., 2011). Therefore, students need various features and opportunities that support the knowledge building process (Lee, Chan, & van Aalst, 2006). These include the ability to ensure a collaborative study environment; an exclusive study area in which students can primarily structure their opinions in their respective fields and then present these opinions to group members; a system in which students can assess both themselves and group members and support their opinions; and source support. It is observed that “scaffolds” draw the most attention to these features supporting knowledge building (Scardamalia, Bransford, Kozma, & Quellmalz, 2012).