



College students' skills of online argumentation: The role of scaffolding and their conceptions



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ABSTRACT

Previous studies have suggested that students perform better in certain qualities of the argumentation skills with scaffolding. Moreover, many researchers have proposed that students' conceptions may be related to the progress of learning activity. To investigate the effects of scaffolding and students' conceptions, two studies were conducted in an online argumentation environment, namely iArgue. The result of study 1 indicated that providing scaffolding may improve only students' argumentation skills at lower levels (i.e. claims and grounds), but not their argumentation skills at higher levels (i.e. warrants, backings, and rebuttals). The outcome of study 2 inferred that students who perceived higher goal and more sophisticated process of online argumentation had better argumentation skills at higher levels. The interaction effects of scaffolding and students' conceptions were further probed and concluded that the effects of students' conceptions did not depend on scaffolding tools. Further implications were discussed in the paper.

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1. Introduction

Recently, the importance of argumentation skills has been acknowledged in the field of education and learning science. For example, Kuhn, Goh, Iordanou, and Shaenfield (2008), Ogan-Bekiroglu and Eskin (2012), and Richardson and Ice (2010) have indicated that the development of critical (or higher-order) thinking and the quality of discourse may be enhanced during the argumentative process. It is generally suggested that research on argumentation be conducted from two different perspectives: *arguing to learn* (Jonassen & Kim, 2010; Osborne, 2010) and *learning to argue* (Jonassen & Kim, 2010; Osborne, Simon, Christodoulou, Howell-Richardson, & Richardson, 2013).

On the one hand, *arguing to learn* refers to the development of argumentation skills, which is thought of as the necessary element for the purpose of obtaining knowledge. Based on Toulmin's (1958) argument pattern, an argument should include a number of components, consisting of *claims*, *grounds*, *warrants*, *backings*, and *rebuttals*. *Claims* are propositions or assertions; *grounds* refer to evidence from the Internet, books or experimental data; *warrants* are reasons used to support the connection between claims and evidence; *backings* are generalizations used to support warrants; *rebuttals* are reasoned objections used to challenge the validity of warrants or backings. According to Erduran, Simon, and Osborne (2004), these components are often placed in a hierarchical order. That is, grounds should support claims, while warrants connect evidence (grounds) to the

claims. Moreover, backings should provide correct and relevant sources of warrants, while rebuttals evaluate the constraints of solutions.

Without doubts, Toulmin's work has been utilized by numerous scholars for the exploration of the quality of argumentation during its practices (Evagorou & Osborne, 2013; Jeong & Joung, 2007; Ogan-Bekiroglu & Eskin, 2012). Among these studies, an amount of research has revealed that students may have difficulties in engaging in a profound argumentation activity. For instance, students may find it difficult to collect evidence to support the claims (Bell, 2004), to provide proper evidences (Sandoval & Millwood, 2005), or to rebut others' arguments (Cavegnetto, Hand, & Norton-Meier, 2010). Hence, a number of studies (e.g. Berland & Reiser, 2010; Reiser, 2004; Sampson & Clark, 2011) have been conducted to improve students' argumentation skills, so that students may be involved in the argumentation activity with deeper engagement.

Loll and Pinkwart (2013) have suggested that the implementation of online argumentation systems may be a helpful device to help students enrich their argumentation skills. First of all, in an online argumentation environment, students may obtain information with the use of graphs, tables, and threads; they may then build their structure of argumentation and construct their own arguments accordingly. Besides, as Lin et al. (2012) have suggested, scaffolding may play a role in enhancing students' argumentation skills. A number of studies have been conducted to investigate on the effects of scaffolding tools in an online learning environment, such as question prompts (Hew & Knapczyk, 2007; Jonassen et al., 2009; Lee, Srinivasan, Trail, Lewis, & Lopez, 2011), expert modeling (Liu & Bera, 2005), and concept mapping (Lee & Nelson, 2005). For example, Cho and Jonassen (2002) utilized Toulmin's pattern of argumentation to examine the effects of providing concept mapping

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as a scaffolding tool on the argumentation processes. It was found that college students with the support of scaffolding created more claims and evidence than those without. Consequently, it may be inferred that providing scaffolding tools in an online argumentation environment could be an important source for students to improve the quality of online argumentation.

On the other hand, *learning to argue* refers to the enhancement of relevant abilities for students to support their ideas with deeper engagements during the argumentation process. To illustrate, Venville and Dawson (2010) have demonstrated that students' conceptual understanding and informal reasoning were improved by employing argumentation activities. Furthermore, there is increasing research in understanding with students' beliefs about the purposes and process of learning they experienced; that is, conceptions of learning (Tsai, 2009). It is worth noticing that when Tsai and Tsai (2013) probed whether providing question prompts as a scaffolding tool was related to college students' conceptions of online argumentation and their approaches to online argumentation, four categories of conceptions of online argumentation were revealed. These categories of conceptions comprised *expressing ideas*, *discussing ideas*, *negotiating ideas*, and *reflecting on and extending ideas*, which were further characterized in terms of their fragmented or cohesive features. Generally speaking, *fragmented conceptions*, including expressing ideas and discussing ideas, showed limited knowing of the associations between the learning environment and learning itself, while *cohesive conceptions*, including negotiating ideas and reflecting on and extending ideas, represented a better understanding of the relation between them.

A framework, presage–process–product (3P) model, was proposed by Biggs (1987) to understand students' learning. Yang and Tsai (2009) have proposed that students' conceptions should be regarded as one of the presage variables; their approaches are viewed as process; and learning outcomes are termed as product. In this framework, the components not only interplay between each other, but also have a movement from presage to product factors. It is generally believed that students' conceptions consequently guide their approaches and learning outcomes (Burnett, Pillay, & Dart, 2003). Dart et al. (2000), Ellis, Goodyear, O'Hara, and Prosser (2007), and Yang and Tsai (2010) have found that students with cohesive conceptions make better progress than those with fragmented conceptions. Similarly, Ogan-Bekiroglu and Eskin (2012) have indicated that if students have the ability to talk more and represent their ideas during the argumentation process, they may be better engaged in the activity. Consequently, it may be inferred that if students hold cohesive conceptions, they may be more likely to talk more about their ideas and be more engaged in the argumentation process.

Recently, much research exploring how scaffolding may be related to the quality of argumentation has been conducted (Cho & Jonassen, 2002; Hew & Knapczyk, 2007; Jonassen et al., 2009). However, relatively few studies have made efforts to investigate how students' conceptions may be related to the quality of online argumentation. Therefore, the current research attempts to explore college students' engagement in the online argumentation environment first. Then, it aims to examine the how scaffolding and students' conceptions of online argumentation may be related to the quality of online argumentation, including claims, grounds, warrants, backings and rebuttals. To sum up, this paper intends to explore the following research questions:

- What are the effects of scaffolding on the quality of online argumentation, including claims, grounds, warrants, backings, and rebuttals?
- What are the effects of students' conceptions of online argumentation on the quality of online argumentation, including claims, grounds, warrants, backings, and rebuttals?
- What are the interaction effects of scaffolding and students' conceptions on the quality of online argumentation?

2. The online argumentation environment

The present research is a follow-up study of Tsai and Tsai's (2013) work, which investigated the relationship among conditions (with/without providing question prompts as a scaffolding tool), students' conceptions of and approaches to online argumentation in the online argumentation environment. As mentioned earlier, the quality of argumentation may play an important part in online argumentation activities; hence, with different research purposes, the present research focuses on the effects of providing question prompts as a scaffolding tool and students' conceptions on the quality of online argumentation respectively. These parts of results were not reported in the previous study.

In order to present the findings, current research is composed of two studies. Study 1 intends to investigate the effects of providing question prompts as a scaffolding tool in the online argumentation environment. Study 2 attempts to examine students' conceptions on the quality of online argumentation, and the interactions of scaffolding and students' conceptions on the quality of online argumentation. It should be noted that study 1 and 2 are not independent studies. The purpose of separating into two studies is better to represent the different focuses and results. The features of the online argumentation environment and the process of the online argumentation activity are described below.

Sixty-eight voluntary students from a college in northern Taiwan took part in the online argumentation environment. To precede the experiment, seventeen groups were formed. Each group consists of two students with the supporting position and two students with the opposite position. To assign the participants into each group, students were asked to complete personal essay tests, which included two essay questions on two controversial issues. One question was "is capital punishment necessary?", while the other one was "is the development of offshore tourist casinos necessary?".

Seventeen groups were randomly assigned to one of the two treatment conditions. Students in the control condition argued *without* any scaffolding, while those in the experimental condition were provided *with* question prompts as a scaffolding tool. As a result, eight groups (32 students) were assigned to the control condition, and nine groups (36 students) were assigned to the experimental condition. Participants in both conditions were required to discuss the two issues in a period of two weeks (one issue was discussed each week) in an online argumentation environment, namely *iArgue*.

In the *experimental* condition, one of the pre-classified types of argumentation (including claims, grounds, warrants, backing, and rebuttals) had to be chosen by samples when they submitted their opinions. As shown in Fig. 1, an example of providing question prompts as a scaffolding tool is displayed. The corresponding sentence openers were provided behind the pre-classified types, and the corresponding guiding questions were provided under the dialog box. In other words, when a student intended to produce a message related to the claims, a sentence opener of claims (including "The problem is..." or "The problem is caused by...") had to be selected. Moreover, the guiding questions, including "What are the assumptions of the problem?", "What causes the problem?", and "What do you think is the problem?" were presented in the lower side of the window for providing guidance in the process of the argumentation activity.

In the *control* condition, similar to the experimental condition, one of the pre-classified types of argumentation had to be chosen before they posted their opinions. However, students in the *control* condition had to discuss the issues without any sentence openers and guiding questions. Fig. 2 shows an illustration of the *iArgue* interface in the *control* condition.

After the online argumentation activity was completed, forty-five students volunteered to be interviewed for the exploration of their perspectives on the online argumentation environment.

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