

Learning Processes during Online Discussions

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INTRODUCTION

Learning processes during online discussions is a major issue in information science and technology, especially with the increasing number of massively open, online courses (MOOCs). Online discussions involve a group of participants exchanging ideas by posting messages on an electronic medium (e.g., discussion board, knowledge building environment). Due to its information transparency, communication flexibility and opportunities for reflection, online discussions in both independent forums and forums linked to school courses offer students additional opportunities for information processing, higher order thinking and learning (Chen, Chiu, & Wang, 2012a, 2012b; Qiu & McDougall, 2013; Tallent-Runnels et al., 2006).

However, an online discussion does not necessarily guarantee effective learning (Hew, Cheung, & Ng, 2010). This article discusses the advantages and disadvantages that online discussions offer compared to face-to-face discussions and explicates how message attributes and individual characteristics can influence participants' thinking and social relationships (Chen et al., 2012a, 2012b). By understanding the processes by which students contribute new ideas and develop social relationships during online discussions, designers can improve online discussion forum interfaces and educators can help students use online and face-to-face discussions more effectively.

BACKGROUND

While online discussions have several advantages over face-to-face discussions, it also has drawbacks. Online discussions' advantages include information

transparency, communication flexibility and reflection opportunities. As online messages are explicit, relatively permanent and organized, they are more transparent than face-to-face talk. Online messages are written out explicitly and stored. Furthermore, authors can organize online discussion messages to highlight their relationships to other messages via one or more threads and quotes of previous messages (Chiu & Chen, 2013). Some online discussion forums have interface designs that constrain each message to respond to a single previous message, which helps establish clear connections and avoid ambiguous relationships among messages. Readers who heed these explicit relationships will read the related messages together and facilitate their understanding of the messages' content.

As a result of their greater permanence, online discussions are less constrained than face-to-face discussions by time or geography. Whereas face-to-face discussants must be in the same place at the same time, online discussants can review the relevant information or post messages at any time from any location.

Moreover, the greater permanence of online discussions also allow more time between responses compared to face-to-face discussions, especially during asynchronous discussions (Hew et al., 2010). During face-to-face discussions, people are responding in real time to a waiting listener(s) and are less likely to edit their responses. In contrast, posting asynchronous, online discussion messages have much weaker time constraints, so the participants can potentially spend minutes, hours, even days gathering more information from other sources, contemplating their relationships, and evaluating competing claims and justifications before writing a suitable response.

Online discussions also have some relative disadvantages compared to face-to-face discussions. For

example, the lack of nonverbal facial expressions and social cues in online discussions can lead to misunderstandings among participants (Walther, Loh, & Granka, 2005). Also, the greater time flexibility and less immediacy of multi-threaded discussion mode raises the likelihood of unresponsive messages (Hewitt, 2005; Thomas, 2002), off-topic messages (Pena-Shaff, Martin, & Gay, 2001), and lower efficiency when making group decisions (Baltes, Dickson, Sherman, Bauer, & LaGanke, 2002).

Online discussions can take place in independent forums or forums linked to school courses. An independent academic forum is a bulletin board on a specific subject (e.g., high school mathematics), but not related to any class or school. In such forums, peers communicate with one another as they wish, without instructor moderation or inference (Chen, 2004; Chen & Chiu, 2008). In contrast, a course-related forum is a bulletin board or online course platform linked to a specific course (e.g., a MOOC), in which an instructor often structures, scaffolds, or moderates the discussions (Mazzolini & Maddison, 2003).

LEARNING PROCESSES DURING ONLINE DISCUSSIONS

As in face-to-face discussions, learning processes during online discussions occur in the dual space of problem content and social relations (Chiu, 2008). This section explicates the processes by which online discussants create correct, new ideas (micro-creativity) and develop social relationships. It first introduces a framework for characterizing online discussions at the message level, including a message's content and author. Then, it shows how specific message attributes and individual characteristics influence participants' micro-creativity and use of social cues during online discussions. By understanding students' micro-creativity and use of social cues during online discussions, educators can help them engage in beneficial learning processes that aid correct outcomes and positive social relationships.

Characterizing Online Discussion Messages

An online discussion message can be characterized along four dimensions: knowledge content, social meta-

cognition, social cues, and individual characteristics (Chen & Chiu, 2008; Chiu, 2000, 2008; Chiu & Chen, 2013; Chiu & Khoo, 2003; Hara, Bonk, & Angeli, 2000). See Table 1 for the details of the dimensions and categories.

As acquiring useful information is often a key discussion goal, the knowledge content dimension characterizes the information displayed regarding the focal topic: new ideas, old repetitions, and null content (Chiu, 2000). The validity of an idea is clear in some contexts (e.g., arithmetic), but not others (e.g., poetry). A justification provides evidence, an explanation or citation of an authority to support the validity of an idea (e.g., Goldbeck, 1998; Neuman, Leibowitz, & Schwarz, 2000). Online discussants can monitor and try to control one another's actions (*social metacognition*, Chiu & Kuo, 2009). Consider two social metacognitive strategies: evaluations (e.g., agree, disagree) and invitational form (e.g., question, command). Online discussants can use these social metacognitive strategies to evaluate one another's ideas, recognize flaws, and invite audience participation.

Social cues in online discussion messages can be positive or negative. In face-to-face discussions, social cues occur via verbal or nonverbal actions. In online discussions, they can be expressed by words, symbols, or emoticons in written messages (Derks, Bos, & von Grumbkow, 2007). Social cues seek an emotional response and can help build or rend social relationships, which can affect their discussion (Sproull & Kiesler, 1986; Swan & Shih, 2005).

Lastly, the individual characteristics dimension denotes a message author's displayed identity. During online discussions, participants usually do not know one another's actual individual characteristics. Instead, they often portray a public image by their choice of each other's displayed personal information such as online gender, past forum experience, and topic initiator (initiator vs. respondent).

Micro-Creativity Processes during Online Discussions

Micro-creativity is an expressed idea that is both correct (consistent with the problem situation and the subject content) and new relative to the participants' discussion of a topic. Like face-to-face discussions, online discussions with greater micro-creativity are

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