Learning from virtual interaction:
A review of research on online synchronous groups

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Abstract: Although in general collaborative learning is effective, it is clear that this is not always the case. To explain this, researchers have been suggested to investigate the interaction process occurring in the course of collaboration. Research on face-to-face (FTF) groups have provided clues as to what types of interaction are productive for learning, both at the individual and group level. However, the extent to which these findings apply to online groups is not yet clear. This paper reports a conceptual systematic review of recent studies of online synchronous learning groups. There is little evidence that the types of online interaction deemed favorable are actually associated with individual conceptual learning. These findings challenge the implicit assumption held by many educational technology designers. Implications for future research are discussed.

Introduction

Two heads, more often than not, are better than one. This commonsense wisdom apparently applies also to learning: learning in groups is generally more effective than alone (Cohen, 1994; Johnson & Johnson, 2004). However, research has also found that collaboration does not always lead to better learning outcomes (for a recent metaanalysis, see Springer, Stanne, & Donovan, 1999). To explain this, researchers have been suggested to look into the collaboration process (Dillenbourg, Baker, Blayc, & O'Malley, 1995). Indeed, studies have found that certain forms of interaction process are linked to learning. For example, giving explanations during peer-directed mathematics study groups has been found to be related with subsequent individual achievement (Webb, 1982, 1991). Similarly, interpretive talk, but not descriptive talk, between dyads working to solve a programming problem has been found to be related with group performance and individual understanding (Teasley, 1995).

These and other findings (Barron, 2000a, 2000b, 2003; Chan, 2001; Chan, Burtin, & Bereiter, 1997; Kneser & Ploetzner, 2001; Oshima, Scardamalia, & Bereiter, 1996) demonstrate that certain forms of interaction are associated with individual learning and group performance. However, most of these findings come from studies of face-to-face (FTF) groups. Will the same links be found in online synchronous learning groups? What forms of interaction are associated with individual learning and group performance of online groups? These questions are important because many online learning environment and cognitive tools are designed with an eye to facilitating certain forms of interaction, which are assumed to bear learning benefits.

But why should we suspect that interaction of online groups would be any different from FTF groups? We know that different media have different constraints and affordances for communication. Online, text-based communication affords more persistence of information, meaning that previous utterances do not "evaporate" immediately, as they are recorded in the chat environment. On the other hand, it is limited in terms of emotional expressions, deictic gestures, spontaneous response, and eye gaze, which are subtle but important in achieving "common ground" (Clark & Brennan, 1991). Because of these differences, achieving a grounding criterion sufficient for learning to occur would entail a different process for online and FTF groups.

Furthermore, detailed analysis of groups solving complex conceptual problems shows that successful collaboration is based on the co-construction of a joint problem space (Roschelle, 1995). More recently, another study has proposed that collaboration involves two spaces: a *content space* (which is more cognitive and associated with the problem to be solved), and a *relational space* (which more to do with affective and social aspects of interaction, such as identity and conflict) (Barron, 2003, p. 310). For groups to maintain a joint attention that is productive for individual learning and group performance, these two spaces must be coordinated well. How this complex coordination is achieved, once again, would differ with