

## Chapter 3.6

# Emergent Networks in Computer-Supported Groups

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### ABSTRACT

This chapter focuses on whether computer-mediated communication (CMC) tools are actually working to increase the overall level of participation within learning groups, in terms of increasing diversity of relationships within the group. First, this chapter provides a broad overview of social network analysis, and a synopsis of key concepts related to the network approach. In general terms, the literature review integrates network analysis vocabulary and literature on communities of practice. Then, an accessible example of how to apply network analysis to an investigation of computer-supported collaborative learning (CSCL) groups over time is provided. This is relevant given the increasing popularity of social network analysis, as well as people's growing dependence on CMC tools to learn, work and play. The results contribute to the ongoing discussion regarding the role technology is having on relationships in

computer-mediated contexts, and demonstrate the application of social network techniques to the study of group processes over time.

### INTRODUCTION

Humans always find themselves involved in social groups. These groups can be predefined, such as a group of people working in an office with a specific hierarchical organization (e.g., managers and subordinates), or emergent, such as a group of friends that evolves over time. Within these groups, some people tend to have connections with a large number of others in the group, while other people tend to only interact with a small set of group members. The study of social structure within groups, and of how people fit into different roles within a group, is referred to as social network analysis.

At the group level, the study of communities of practice (Brown & Duguid, 1991), knowledge-building communities (Scardamalia & Bereiter, 1994) and computer-supported collaborative learning (CSCL) communities emphasize the importance of collective participation for knowledge creation and learning. The advantage of incorporating technology into traditional learning spaces lies in the potential to promote dense, active communication networks among participants; technology should facilitate increased interaction among learning community members. However, the extent which CMC actually promotes social interaction with diverse others when technology use is situated in an existing social context has received little research attention.

Social network analysis affords an effective interpretive framework to examine relationships between actors in a network or system. The goal of this chapter is not to review the broad range of various network studies (instead, see Mizruchi & Schwartz, 1987). Rather, the following text provides a brief overview of core concepts related to social network analysis, and the implications of those concepts on the bulk of network-based research. Next, the results of a study exploring the impact of an existing social network, on a subsequent emergent network is discussed in detail. This study is presented to demonstrate the utility of using a social network approach to analyze computer-mediated groups over time.

## **BACKGROUND**

### **Social Network Analysis**

In general, the focus of social network studies is on relationships between social entities (Scott, 2001) and the systematic analysis of patterns of relationships between people. Social network studies analyzing patterns of interactions between actors situated in a network offer predictive capabilities regarding individual attitudes and behavior. For

example, Bavelas (1950) found that people who are socially integrated into work groups exhibit higher levels of satisfaction and productivity, opposed to those less connected. Social and behavioral sciences continue to become more interested in social networks because the ‘relation’ is utilized as the unit of analysis opposed to analysis of attribute data common in survey research; the focus is on the relationship between social entities. Networks map patterns of relationships which people use to facilitate the full spectrum of interpersonal exchange, and at their most fundamental level, function as an instrument for information transactions. Figure 1 depicts examples of centralized and decentralized social network structures.

Some of the earliest network research used experiments to force communication patterns (structure) on participants to explore the impact different structures have on satisfaction and performance (Bavelas, 1950; Leavitt, 1951). A review of this literature suggests that central actors in structurally predefined networks (e.g., circle or chain) differ from actors in the periphery of the network in important ways. For example, persons in central positions tend to require less time to solve problems, communicate more frequently, make fewer errors, and report higher levels of satisfaction than people at the periphery of a network (e.g., Bavelas, 1950; Bavelas & Barrett, 1951; Leavitt, 1951; Shaw, 1978). The results of this series of experiments suggests that measures of connectedness, like centrality in communication networks, is associated with positive outcomes.

Network research also explores the relationship between network structure and the diffusion of innovations, focusing on advantages associated with central network positions (Coleman, Katz, & Menzel, 1957). Diffusion studies suggest that centrally-located, or “visible,” actors in social networks tend to be perceived as opinion leaders and are earlier to adopt new innovations resulting from affordances accrued via their network position. However, here emphasis is placed on the structures of relationships, ignoring socio-

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