Chapter 10
Using Social Network Analysis to Examine Social Hierarchies and Team Dynamics on Instructional Design Projects

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ABSTRACT
Social network diagrams have been an important part of understanding social dynamics from dyads all the way to human civilizations. In e-learning, social networks have been used to evaluate how online learners engage with each other and what the implications of that may be for the quality of learning. In this chapter, social networks are used to evaluate various social aspects of the development teams in their work. A number of contemporary Instructional Design (ID) projects, described briefly as comparative case studies in the chapter, are used as the contexts for these social networks and visualizations. While these depictions tend to be systemic-level ones, there are insights from considering the micro/ego-level views. The objectives of this chapter are to introduce one approach to the uses of social network visualizations in analyzing the internal and external social dynamics of instructional design across a number of institutions of higher education.

INTRODUCTION
Social network science is a field which has evolved over the past seven decades. Early thinkers who contributed to social network concepts include sociologists David Émile Durkheim (social pathologies), Ferdinand Tönnies (“gemeinschaft and gesellschaft” / community and society), and Georg Simmel (social geometry, the metropolis). The study of social networks started in the 1930s with the work of Jacob Moreno, who originated the “sociogram”—a connection diagram which shows people’s connections with each other. John Barnes (a British anthropologist) originated the term “social network” in the 1950s. Over the years, the field has evolved with broad influences from sociology, political science, organizational studies, discrete mathematics, and recently, computer science’s network analysis and graph theory (from math).

Today, social network research is highly interdisciplinary. It is used to theorize; to research; to analyze phenomena, and to make decisions. In higher education, social networks have been ana-
analyzed in terms of organizational change. They have also been studied in the context of online learning to look at the various social networks that form around academic discourses; for example, learners who are central in a network tend to achieve higher grades, but those on the periphery are more willing to explore new network linkages (bringing with that the possibility of new, advantageous, and boundary-spanning ties through weak links) (Cho, Gay, Davidson, & Ingraffea, 2007). Henttonen (2010) conducted a deep literature review in the study of social networks on groups as a unit of analysis and highlighted some emerging themes in terms of group structures and team performance. In this chapter, social network analysis will be applied to how instructional design teams coalesce and function on a number of real-world projects, which occurred within the last seven years.

While social networks may be depicted visually in a variety of ways, they will be displayed here as node-link diagrams (a type of line graph), which consist of nodes (also known as “egos” or “actors” or “vertexes”) and links (lines, edges, or arcs). Nodes (expressed as dots) represent entities, and links (expressed as lines) represent the relationships between them. These elements are expressed on a two-dimensional (2D) plane on the x and y axes. They may be read from top to bottom, left to right, from the center outwards, from the periphery inwards, and in a range of other spatialized ways. The spatial layout of these entities and relationships contain meaning depending on the type of node-link diagram. In one conceptualization, the nodes closest to the core are the most critical in a network. Those in the semi-periphery and the periphery are less critical to the mission of that particular organization. (Sometimes, nodes are moved slightly to improve legibility and visual coherence.) The centrality of a node is seen as indicative of various features, including the “(potential for) autonomy, control, risk, exposure, influence, belongingness, brokerage, independence, power and so on” (Borgatti & Everett, 2006, p. 467). The measure of centrality differs based on different models, but in this chapter refers to betweenness or the connectivity of a node with others in the network, which suggests a high amount of resources flowing to that node (high in-degree or amount of in-flow of information and resources from other nodes). Because this work did not analyze traffic flow per se but only linkages, this is only using betweenness as a centrality measure, which is in line with social network science conventions.

Some assumptions of social network science are that human relationships matter, from the micro ego-node (egocentric point-of-view) level to the macro systemic large-scale structure. Some social groupings coalesce in an ad hoc way. Other groups are organized. People generally are attracted by shared likenesses or “homophily” (McPherson, Smith-Lovin, & Cook, 2001). This underlying concept informs the idea that a person may be identified by “the company he/she keeps”. However, various social groupings, particularly work-related ones, may be heterophilous because of the need for cross-functional team collaborations. (Some researchers have argued that people have a tendency towards novelty and complexity, and these may mean acquaintances who are fundamentally different or variant from themselves.) There are many small world networks with short average path lengths over the entire graph and a strong degree of clustering or local ego neighborhoods (Watts, 2003); this means that people are connected by a few short paths to anyone else in what is known as the well known “six degrees of separation.” (Theoretically, strong clustering often means distant path lengths between individuals. There is usually an inverse correlation between clustering and path lengths.) The thickest ties are those in which the resources and information move two-ways between nodes (in which the relationships are reciprocated) in an active way. In organizational research, the “walk” of communications through a network tend to map fairly closely to the organizational structure, which