Chapter 18
Social Network Informed Design for Learning with Educational Technology

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ABSTRACT
This chapter discusses and illustrates how knowledge of social networks can be used to inform social and technical design for learning and teaching in higher education. The chapter introduces the social network perspective and how this can be used to explore learning. It shows how a relational approach can be used to explore the basis of learning ties, uncover social roles and positions, and form a basis for a network’s social capital. This is followed by a discussion of current research directions illustrating how this approach can be applied in education. This research indicates how knowledge of informal learning networks can facilitate informed design for learning, teaching, and professional development.

INTRODUCTION
This chapter describes features of social networks that can be tapped to improve social and technical design for learning, teaching and professional development in higher education. By social networks we mean the configurations of connectivity that exist when people interact with each other by communicating, sharing resources, and working, learning or playing together, supported through face-to-face interaction as well as through the use of educational, and information and communication technology. Each interaction defines a connection between people, known as a social network tie. These ties vary in strength from weak to strong according to the range and types of activities people engage in and the importance, reciprocity and longevity of the connection. The
patterns of connectivity described by the full network of ties help inform design of social and/or technical support for learning, knowledge acquisition, trust, collaboration and community.

While a substantial body of literature exists on social networks, particularly in relation to analytic techniques of social network analysis, fewer studies and reviews address learning (De Laat, 2006). This chapter focuses on how learning can be explored and examined from a social network perspective, leading to network informed design for learning, including the use of educational technology. By informed design we mean the design of meaningful collaborations, based on social network configurations that support learning, teaching and professional development. The first half of the chapter presents background on a social network perspective on learning. This is followed by a presentation of current research directions on how social network analysis can be used to study and design informal learning networks among teachers.

A SOCIAL NETWORK PERSPECTIVE ON LEARNING

There are two features that distinguish the social network approach to the study of social phenomena. The first is that the unit of analysis is the interaction between actors, rather than an aggregate of actor behavior; and the second is that attention is given to the network structures that emerge from interactions among actors. Social network relations (i.e., interactions, transactions, communications, collaborations, etc.), are the basis for ties between actors in a network (Wasserman & Faust, 1994). The principles of social network analysis derive from graph theory, which looks at patterns of relational connections between nodes in a graph. The nodes in a social network graph are the actors, who can be individuals or collective units such as teams or organizations. In learning and education settings, the actors may be teachers connected to each other within a school; teachers and students in a class; schools connected as part of a district school system; departmental connections across a university; or universities connected through inter-university course sharing. In contemporary settings, these connections are as likely to be accomplished through technology as they are through face-to-face contact.

The network approach draws our attention to the way patterns of interaction provide an environment for exchange of resources (Wasserman & Faust, 1994). Such resources include tangible goods and services, and intangibles such as communication, social support, information, knowledge and learning. From a design perspective, data on social network patterns can be used to provide an understanding what kinds of information, objects, communications, etc. are exchanged among network actors, and how the flow of these exchanges supports overall goals. Systems can be designed to facilitate such flows, and to correct or adjust existing flows.

Of equal importance are the overall structures that networks exhibit. Observing or using statistical techniques to analyze patterns of interaction reveals such structures (Scott & Carrington, 2010). One well-used measure of network structure is density, the extent to which all members of a network are connected to each other. Research has shown that members of dense networks are likely to be in frequent contact, and thus quickly become aware of new resources that enter the network. Network structures also show how some parts of the network may be densely connected, while other areas are only sparsely connected. Cliques, clusters or components show dense subset of network members who are likely to have access to similar resources. By contrast, isolates or isolated cliques may be found with no connection to other parts of the network, and thus off the main route for resources more generally available to others.

Research in social network analysis provides a rich history of studies, concepts and analytical techniques for considering patterns of network
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