Information seeking in secondary schools: A multilevel network approach

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ABSTRACT

In this study, we investigate information seeking interactions in secondary schools from a multilevel network approach. Based on network-related theories, we examine the facilitating role of formal subunits. We apply exponential random graph models for multilevel networks and summarize our findings by using a meta-analysis technique. Our results indicate that formal subunits (e.g. subject departments) can, to some extent, facilitate interactions, in loosely coupled organizations (e.g. secondary schools). Finally, this study shows that a multilevel network approach can provide a more informative representation of information seeking ties in knowledge-intensive organizations.

1. Introduction

During the last decades, researchers came to the conclusion that the exchange of information is crucial when it comes to the functioning of organizations and their members (e.g., Borgatti and Cross, 2003; Cross et al., 2001b). According to Morrison (2002), information seeking is a way to cope with ambiguous or uncertain situations individuals are confronted with. Previous research has demonstrated the importance of personal relations in the acquisition of information (Burt, 2000; Granovetter, 1973). Especially in knowledge-intensive organizations, wherein working conditions are uncertain and subject to constant change, scholars argue that social capital is crucial in the development of individual knowledge and skills (Coleman, 1988; Frank et al., 2011; Zhao and Frank, 2003). To investigate this pattern of information seeking relations, several of these studies adopted a social network approach (e.g., Haythornthwaite, 1996; Scott, 1991; Wasserman and Faust, 1994). Within this approach, information is regarded as a resource that is transferred from one actor to another through interactions. These actors are referred to as nodes, interactions are described as ties, and the entire set of nodes and interactions is regarded as the social network (Brass et al., 2004). Moreover, this approach makes it possible to address the emergence of information seeking ties, and how this formation is facilitated by formal subunits (e.g., Agneessens and Wittek, 2012; Brennecke and Rank, 2016).

1.1. Information seeking in schools

An organization that has been of particular interest for researchers focusing on information exchange, are schools. Schools can be regarded as knowledge-intensive organizations due to the complex character of teaching, including student needs that vary, teacher-student relations that are uncertain and no uniform guidelines on how to teach (Bidwell and Kasarda, 1980; Elmore, 2000). As a result, teachers often engage in several relationships with other school team members in order to meet the intellectual, emotional, and social demands of teaching (Little, 1990). For instance, they address one or multiple colleagues when they need information on students, successful class-practices or effective class management in order to (better) fulfill their daily teaching responsibilities. In line with research in other organizations, network studies included both individual characteristics and features of the formal structure of the school to explain the presence or absence of information ties. For example, the research of Penuel et al. (2010) concluded that teachers who were assigned to the same grade level and were present in the same meetings had more ties in comparison to teachers who were not. Spillane and Hopkins (2013) found that characteristics of the formal school structure, such as formally

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assigned leadership positions and subject departments play a crucial role in the formation of information ties in elementary schools. More recently, the study of Spillane et al. (2015) showed that teachers interact more with colleagues who are assigned in the same grade and this formal structure is more influential than individual characteristics such as gender and race. All these studies argued that formal subunits within the school provide teachers the opportunity and a specific focus for interactions about teaching (Spillane and Kim, 2012; Spillane et al., 2011).

1.2. State of the art

Within these studies, formal subunit membership has been reduced to an individual attribute. The facilitating role of formal subunits was then tested by assessing the effect of shared subunit membership. In other words, these studies examined if two actors of the same subunit have a higher chance to interact. However, several limitations can be formulated with this approach. First, to estimate the effect of shared subunit membership, binary or categorical predictors are included for each subunit. However, schools have several subunits and teachers are often member of multiple subunits, leading to a high number of coefficients that need to be estimated. Second, although these studies provided information on the individual tendency to interact with colleagues who are member of the same formal subunit, no conclusions can be made on more general tendencies of formal subunits to facilitate ties. Third, network researchers have indicated that organizations are multilevel systems with individuals nested within teams, functions, or divisions (Zappa and Lomi, 2015). In other words, subunit membership cannot simply be reduced to an individual characteristics, but subunits themselves should be treated as a distinct level of nodes at a different level (Kossinets, 2006). Tranmer et al. (2016) even indicated that incorrect inferences can be drawn from social network analysis if the system is represented in an overly simplistic way.

In the light of these limitations and the recent call for a multilevel network approach in organizations, this study adopts a multilevel network approach to investigate the facilitating role of formal subunits for information seeking ties, and this in the context of schools. In line with Zappa and Lomi (2016), we argue that the multilevel nature of social networks in organizations should be framed as a hypothesis to be tested, rather than an assumption to be maintained. Moreover, by adopting a multilevel approach, we want to provide a more informative and contextual richer representation of the interdependences between formal and informal relations in organizations (Lazega and Snijders, 2016). In this study, we apply recent advancements that have been made in the statistical methods to study the emergence of social networks in organizations, taking this multilevel structure into account (Wang et al., 2013, 2016; Žiberna, 2014). Therefore, our aim is not only to provide more insight in this facilitating role of formal subunits, but also to contribute to the application of recently developed models and to the growing literature on multilevel network approach.

2. Taking formal structure into account: a multilevel network approach

March and Simon (1958) first indicated that patterns of interactions contain a hierarchical structure that typically takes a multilevel form. As a result, scholars have started looking at organizations as multilevel systems with individuals and their interactions nested within formal subunits, such as teams or divisions (Lomi and Larsen, 2001; Zappa and Lomi, 2015). Several theoretical arguments can underpin this facilitating role of formal subunits. First, formal subunits create a formally induced homophily (Kleinbaum et al., 2013). Homophily reflects the tendency of similar actors to interact (McPherson and Smith-Lovin, 1987). A general conclusion in network studies is that social interactions are to a great extent homophilous, both on the matter of visible (e.g., race, gender, age) and invisible characteristics (e.g., beliefs, interests) (McPherson et al., 2001). In formal subunits, interests are relatively homogeneous, and, as a result, members of a formal subunit are surrounded disproportionately by others like themselves (McPherson and Smith-Lovin, 1987). Second, formal subunits can be regarded as formally defined social foci (Feld, 1982). Feld (1981, p. 1016) described a social focus as "a social, psychological, legal or physical entity around which joint activities are organized". These joint activities increase the physical proximity of subunit members (Krackhardt, 1994; Kraut et al., 2002) and augment the probability of, sometimes serendipitous, interaction (Borgatti and Cross, 2003). Within these interactions, people gradually come to learn about each other, become more comfortable and develop a bond that enables future communication (Brass et al., 2004). Moreover, formal structures often entail specific locations in physical space (e.g. in the same office or on the same floor), which facilitate interactions with department or team members, but restrict opportunities to interact with others. Third, based on the first two arguments and transactive memory system, it can be argued that members of formal subunits are more aware of the expertise and knowledge of other members (Ren and Argote, 2011; Ren et al., 2006). Borgatti and Cross (2003) indicated that the decision to seek information from a specific other, is informed by the relationship between seeker and other members an individual can turn to. An important characteristic of this relationship is the assessment of one's knowledge and expertise, and individuals are more likely to seek information from whom they know which knowledge and expertise they possess. In other words, awareness of that individual as a possible source of information is a baseline for an information seeking tie.

3. The case of secondary schools

In this study, we apply a multilevel network approach on information seeking ties in the context of secondary schools. Schools are interesting organizations to investigate from a multilevel social network perspective for several reasons. First, schools can be regarded as knowledge-intensive organizations wherein information seeking can be regarded as a strategy to retrieve intangible resources that can help individuals to achieve their goals (Lazega and Pattison, 1999; Reagans and McEvily, 2003). Interactions wherein work-related information is exchanged, are often characterized by a transfer of knowledge, expertise, mentoring and joint problem solving (Cross et al., 2001a,b; Little and McLaughlin, 1993) and are therefore considered as the building block of knowledge development in schools (Darling-Hammond and Richardson, 2009; Elmore, 1996; Spillane and Hopkins, 2013). Several studies indicated that sharing expertise and knowledge among teachers is one of the most used and successful professional development activities resulting in benefits for both students and teachers (e.g., Darling-Hammond, 2008; Pil and Leana, 2009). In other words, information seeking not only affects individual performance of teachers, but also influences students and their results. Second, in comparison to previously investigated organizations wherein organizational members often work collaboratively to achieve common goals (e.g., Brennecke and Rank, 2016; Gulati and Puranam, 2009), teachers spend a large amount of their time alone with their students. As a result, the teaching profession has often been described as an individual and even isolated profession, with teachers working autonomously within the four walls of their classroom. Although the common goal is to achieve good student results, actual 'teamwork' among teachers is very limited (Vangrieken et al., 2015).