The Interplay Between Interpersonal and Electronic Resources in Knowledge Seeking Among Co-Located and Distributed Employees

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In the information age, a common problem for employees is not lack of resources but rather how to sift through multiple resources, both electronic and interpersonal, to retrieve and locate true expert knowledge. The main objective of this study is hence to explore employees' simultaneous usage of both resources and to identify situations where employees showed a clear preference of interpersonal resources over electronic ones, and where employees found these two resources (a) (ir)replaceable and (b) complementary. Both qualitative interview data and quantitative social-network data were collected from a university-affiliated community educational office. Data analysis showed that (a) social relationships were crucial for seeking and gaining actual access to needed knowledge; (b) employees were task-driven in knowledge seeking and obtained different types of knowledge depending on availability; and (c) the choice between interpersonal and electronic resources was determined by the characteristics of the knowledge sought as well as such contextual factors as time, cost, and location. Additional interviews from other study contexts validated most of our findings, except those that require collection of complete social-network data. The article ends with a discussion on how organizations can better leverage their investment in human and technical resources to facilitate knowledge seeking.

Introduction

In an information society, timely access to expert knowledge is crucial for employees to make informed decisions (Choo, 2001). Yet, seeking expert knowledge when needed can be a very challenging task. Knowledge seeking involves the processes of locating and retrieving needed information and expertise to complete certain tasks. While some scholars have argued that data, information, and knowledge are three different types of intellectual resources that an organization needs to manage, Alavi and Leidner (2001) noted that these differences reflect different perspectives of knowledge. Hence, in the current research, we use the term knowledge seeking as a more general term to describe the activities that employees engage in to locate needed intellectual resources.

Most organizational research on knowledge seeking has focused on the role of interpersonal relations in the search process (e.g., Hansen, 1999; Morrison, 1993, 2002). One common oversight of these studies, however, is that no attention was paid to how employees gain needed knowledge from electronic resources. Indeed, in contemporary organizations, more employees are turning to both interpersonal and electronic resources when seeking expert knowledge (Yuan, Fulk, & Monge, 2007), and organizations are increasing their investment in information and communication technology to facilitate knowledge sharing and seeking in organizations (Hendriks, 1999). We believe that both interpersonal relationships and electronic knowledge repositories are important resources for employees to find needed knowledge.

Kalman, Monge, Fulk, and Heino (2002) summarized four advantages of digitizing knowledge in electronic repositories. First, knowledge holders and knowledge seekers can asynchronously carry out their tasks at their own pace. Second, knowledge holders can satisfy multiple requests though a single contribution to the repository. Third, knowledge seekers can obtain needed knowledge without having to know the knowledge holders in person. Finally, knowledge seekers can go beyond organizational boundaries to search for knowledge at low cost. Despite these advantages, locating
true knowledge from electronic resources can be challenging. On one hand, the Internet has made it easier for employees to obtain and share knowledge with each other at a relatively low cost. On the other hand, the reduced cost of publishing online and the open nature of the technology also have made the Internet replete with false and/or misleading information posted by not-so-credible sources. Consequently, a common problem for employees is not lack of sources but rather how to sift through and analyze the information they receive to determine which source provides true expert knowledge (Wathen & Burkell, 2002). Under such situations, interpersonal connections with credible sources become extremely valuable to enable employees, particularly new ones, make informed judgments.

The main objective of this study is to explore employees’ simultaneous usage of both resources and to identify situations where employees showed a clear preference of interpersonal resources over electronic ones, and where employees found these two resources (a) (ir)replaceable and (b) complementary. We hope that the results of this study can help to shed light on how to better utilize knowledge resources via the development of stronger interpersonal relationships and the technical competence in seeking needed knowledge. Consequently, organizations can better leverage their investment in human and technical resources to facilitate knowledge seeking. We believe that such a study has the potential to make valuable contributions to knowledge-management research in the fields of communication, information science, and general management.

The current article is organized as follows: First, we review related theories and empirical studies on knowledge seeking. Based on these reviews, we present four research questions concerning factors influencing knowledge seeking. Next, we present the findings from a mixed-method study conducted with employees from a small, semidistributed organization in which 5 of the 14 employees were co-located and the remaining employees were distributed in multiple locations. The discussion of our findings is organized around themes that we identified in previous research on knowledge seeking, along with some new discoveries. We then discuss results validation through additional interviews with individuals who work in a similar capacity as the participants of our study. We end the article with a discussion of practical implications for how organizations can help their employees retrieve expert knowledge from both interpersonal and electronic resources.

Knowledge Seeking Through Different Avenues

Seeking Knowledge Through Interpersonal Avenues

Previous research has shown that pleasant interpersonal relationships between knowledge seekers and providers contribute to effective knowledge retrieval because some “competent jerks,” as termed by Casciaro and Lobo (2005), may choose not to share their expertise unless there is a preestablished relationship with the information receiver. Moreover, as Kim and Mauborgne (1997) observed, knowledge is a different resource than land or money, and thus cannot be “forced” out of people. Consequently, building ties with experts becomes one of the most viable ways to gain actual access to expert knowledge.

Most existing studies on knowledge seeking from peers or supervisors has focused on the strength of network ties. A network tie is considered strong when communication is frequent and emotionally close (Granovetter, 1982; Krackhardt, 1992). Hansen (1999) found in field research that strong ties were more useful for sharing knowledge that is tacit and difficult to articulate or codify whereas weak ties were more useful for searching for explicit, codified knowledge (Polanyi, 1967). Such a finding of an interaction effect between knowledge type and social relation, however, was not supported across different studies. For instance, Reagans and McEvily (2003) found only weak support of Hansen’s proposition. Specifically, while weak ties might have some value for knowledge seeking, strong ties were actually preferred for both knowledge seeking and transfer. This inconsistency in findings across studies suggests that it is a topic worthy of further exploration; that is, to what extent is the relative importance of different structural properties of social networks contingent upon characteristics of the expert knowledge sought by employees?

In addition to the widely studied classification between tacit/noncodified and explicit/codified dimensions of knowledge reviewed earlier, Winter (1987) proposed four dimensions to be used to describe an organization’s knowledge: tacit/articulable, observable/not-observable in use, complex/simple, and dependent/independent of a system. Zander and Kogut (1995) maintained that besides the degree of codification, how easily capabilities can be taught has a significant influence on the speed of transfer. Abrahamson and Rosenkopf (1997) proposed that ambiguity and uncertainty of knowledge also influence what types of social relationships are more preferable for effective and efficient retrieval of expert knowledge. Alternatively, Cross and Sproull (2004) suggested that goals and tasks influence knowledge seeking. They identified five types of action knowledge that people seek from different relationships (i.e., solutions, referrals, problem reformulation, validation, and legitimation), depending on their different task requirements. Byström and Järvelin (1995) also suggested that repetitiveness, analyzability, and a priori determinability of tasks can influence task complexity, which in turn would influence types of information that seekers are interested in obtaining. Informed by the theories and findings reviewed earlier on knowledge seeking from interpersonal avenues, this study aims to address the following research questions:

**RQ1:** What role do interpersonal relationships play in knowledge seeking? What properties of networks, including strength of ties, will influence this process?

**RQ2:** What factors will influence knowledge-seeking activities? To what extent will the different characteristics of knowledge and the different task purposes interact with different characteristics of ties to influence this process?
Seeking Knowledge From Electronic Resources

In addition to interpersonal resources, we believe that electronic resources are equally valuable for knowledge seeking. While most organizational behavior research on this topic has focused on using people as knowledge repositories (e.g., Hollingshead & Fraidin, 2003; Lewis, Lange, & Gillis, 2005; Moreland, 1999), nonhuman resources can serve similar functions as well. For instance, electronic expertise directories can be integrated into group decision support systems (Nevo & Wand, 2005) and function as a communal transactive memory system (Kankanhilli, Tan, & Wei, 2005; Yuan et al., 2007) through which employees can learn about each other’s areas of expertise so that they can be more targeted in knowledge seeking. Such a system will allow all members of an organization to locate and retrieve knowledge, even if they are unable to meet face-to-face to learn about each other’s specialty. The benefit of having such a system will manifest itself more when people work in large organizations or at distributed locations that make direct social interactions difficult; however, effective retrieval of expert knowledge from electronic resources poses a different set of challenges. First, electronic expertise directories may not always exist, particularly for some very specialized areas of expertise. Second, employees need to have adequate technical skills to navigate the system. Yuan et al. (2005) found that team members were more likely to use organizational knowledge repositories when they had adequate levels of technical competence and felt comfortable using the technology.

Knowledge-seeking studies in nonorganizational contexts have identified a host of other factors that make the Internet a more preferable source. The first factor is time constraints. Fidel and Green (2004) discovered that saving time was the most frequent reason for selecting a documented source. Second, electronic sources allow easier comparison of information across different sources and can provide an interactive forum to support decision-making by gathering opinions from distributed experts. Third, the Internet also allows individuals to conduct specified searches at their own pace as the problem-solving process evolves (Savolainen, 2008). Note, however, that many of the studies cited earlier have focused only on non-work-related information seeking. For employees, seeking technical expertise from intranet/Internet sources can be quite different from seeking everyday information such as the location of a good restaurant. The major source-preference criteria identified in the aforementioned studies must be reexamined to discern whether they also pertain to job-related knowledge seeking. Building on the studies reviewed earlier, we pose the following question:

**RQ3:** What factors influence people’s use of electronic resources for knowledge seeking?

**Making a Choice**

Research on how employees choose between interpersonal and electronic resources when seeking knowledge has been limited. Computer-mediated communication (CMC) studies can provide some guidelines as to when interpersonal communication is preferred over other media; yet, the primary focus of CMC research has been determining the extent to which electronic media can achieve the same degree of social presence as face-to-face interactions (Short, Williams, & Christie, 1976). For instance, media richness theory (Daft & Lengel, 1986) focuses on examining the capacity of various communication technologies to convey nonverbal cues to emulate face-to-face communication, and then on matching the level of richness of media to the ambiguity level of a task. A main proposition of the theory is that complex tasks require using rich communication media. The theory has found mixed support in empirical research. More recent studies (DeSanctis & Poole, 1994; Walther, 1996) have demonstrated that both social presence theory and media richness theory are overly technologically deterministic in that they fail to recognize human creativity in adaptively using technologies. A more social approach, then, would stress the importance of social influence (Fulk, 1993) in this process because perceptions of related social norms of technology use can influence not only the actual usage but also the perceived value of using a particular communication technology for resource exchange (Yuan et al., 2005). Both adaptive structuration theory of technology use (DeSanctis & Poole, 1994) and hyperpersonal theory (Walther, 1996) of CMC emphasize the interplay between features of technology and human adaptability in technology use. Building on the aforementioned theories and studies, this research aims to further explore the following question:

**RQ4:** Under what situations will employees prefer interpersonal versus electronic resources when seeking knowledge? To what extent are interpersonal and electronic resources replaceable (or irreplaceable) or complementary?

**Field Research**

**Sample**

To gain a clearer understanding on how organizational members seek needed knowledge for their daily work, we first conducted a study of a distributed agricultural educational unit affiliated with a large research university in the Northeastern United States, and then conducted additional interviews with 10 peer professionals. The university has a main (i.e., central) campus, one satellite campus, and several research facilities and field stations throughout the state. The studied unit has 14 educators who are located in seven communities across the state, with five educators located on either the central or satellite campus of the university. The distributed employees are responsible for conducting research-based educational programs and providing one-on-one consultations in their communities and, in some cases, in a multicounty area. Because each employee has expertise in different areas, the content of these programs and consultations across the state often vary considerably; however,
all interventions focus on aspects of agricultural and natural science.

All 14 of the educators in this unit participated in this study. Face-to-face interviews were conducted with 6 employees of the organization, but due to time and distance constraints, the other interviews were conducted over the telephone. The interview length averaged 54 min. Each participant was given an ID number for reporting findings and results. At the time of the interview, employees were on average 47 years old, with the majority (55%) between 41 and 50 years. Roughly 43% of the employees were female, and no gender differences were observed in how employees seek needed knowledge to complete their tasks. Roughly 64% held a master’s degree as their highest degree, and 36% had earned a doctorate. On average, employees had spent roughly 15 years in job-related positions, and had worked at the office for over 12 years (SD = 6.34 years). Table 1 summarizes the background information of the participants.

While this educational unit differs from a typical community organization where all employees are co-located and strongly bonded to a particular geographic community, it is representative of those community organizations that serve multiple regions and that rely more on information technology to communicate among employees. The organization has two directors. They also are program coordinators, along with three other coordinators. They work in project teams to organize educational programs in one of five focus areas of the organization. Yet, collaborations among employees across focus areas are common when a project demands expertise from multiple focus areas. The loose couplings among employees (Weick, 1976) can be observed from not only the employees’ task assignments but also from their daily communications. Of the 14 employees of the organization, 5 work in the main office building on the university’s satellite campus, with the remaining scattered in seven other locations such as field stations across the state. Co-located employees frequently meet each other face-to-face as they both share space and attend cosponsored events; they also see each other more frequently during the growing season, as they regularly attend joint meetings with farmers and other affiliates. The distributed employees, however, meet with the other employees face-to-face only at the monthly staff meetings. For the rest of the year, distributed employees primarily rely on telephone and e-mail to stay connected with the main office.

Instrument

Data collection entailed two parts. First, participants took part in an interview with questions covering how and through what communication channels employees locate and obtain needed expert knowledge. These questions were semistructured in that they were grounded in findings from previous research on the topic, yet they were purposefully left open-ended to allow for discovery of new themes. Specifically, the questions regarding the type of knowledge that employees obtain were adapted from survey questions used in Hansen (1999), as reviewed earlier. The subsequent phase of data collection included a paper-and-pencil questionnaire on network relationships. With the approval from the University’s Internal Review Board office and the participants’ consent, network data also were collected to determine both task- and non-task-related social ties in the office. Specially, the network question on advice seeking was adapted from Krackhardt and Hanson (1993); the question on friendship ties from Burt (1997); and the question on like and dislike affective relationships from Labianca and Brass (2006) and Labianca, Brass, and Gray (1998). Those participants contacted by phone received the questionnaire by e-mail prior to the interview and were instructed to print out a copy; subsequently, they received a stamped envelope to return the documents to the researchers. After the interviews, researchers often followed up with respondents via e-mail to clarify items covered or to pose additional questions. The interview protocol and survey questions are provided in Appendices A and B.

Coding and Analysis Method

The current study adopted a “concurrent nested strategy” (Creswell, 2003, p. 218), as both qualitative and quantitative data were collected simultaneously during a single phase, with an emphasis placed on the interviews (qualitative), and the questionnaire and social network analysis (quantitative) serving as the “nested” methods. In this “complementary” mixed-method study, each method focused more directly on one of the research questions to provide an “enriched, elaborated understanding” of the central “phenomenon” of interpersonal and electronic knowledge seeking among co-located and distributed employees (Greene, Caracelli, & Graham, 1989, p. 258). By using this design, we hoped to increase breadth of perspective on a complex issue, as the data from both methods were combined in the analysis (Creswell, 2003).

<table>
<thead>
<tr>
<th>Case ID</th>
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<th>Age</th>
<th>Highest degree</th>
<th>Years in organization</th>
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<td>54</td>
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<td>21</td>
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<td>56</td>
<td>MS</td>
<td>9</td>
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<td>17</td>
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<td>PhD</td>
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<td>M</td>
<td>45</td>
<td>MS</td>
<td>18</td>
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</tbody>
</table>

Total = 14 employees: 6 female (43%) 47 years 5 PhD (36%) 12 years

Total: Average age: Total: Average:

8 male (57%) 47 years 5 PhD (36%) 9 MS (64%)

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Interview transcripts were primarily analyzed according to the principles of grounded theory (Glaser & Strauss, 1967) in that we coded for “emergent” concepts rather than preset theoretical categories. In general, we resisted ascribing predetermined theoretical codes from the literature to our data, and instead applied “in-vivo” (i.e., using the words of the respondents) and descriptive codes. After several run-throughs of line-by-line coding (Charmaz, 2001), we grouped the codes into themes, noting what we saw as interconnections, oppositions, or both. Only after denoting these themes did we consider whether (and/or how) they related to extant theoretical constructs, such as those reviewed in the beginning of this article. Because grounded theory-informed qualitative coding does not call for quantitative measurement of intercoder reliability, we addressed reliability concerns by having two of the authors, those present at all of the interviews, concurrently code and analyze the transcripts. These individuals paused frequently to compare interpretations, and to achieve consensus we feel that this iterative process contributed to the reliability of our findings.

Results and Discussion

RQ1: The Role of Interpersonal Relationships

Friendship ties and the impact of location. Consistent with the findings from previous research, knowledge seekers reported that having a friendship tie with the knowledge holder played a major role in influencing from whom they would seek expertise. As Participant 7 described, “If I have a friend who I feel is a good friend and is also in my opinion an expert, I would use that person’s expertise sooner than someone else’s.” Yet, the formation of friendship ties is not easy. Many participants mentioned that location and working on the same project were the two major factors influencing the frequency of communication among employees. When describing their friendships with program colleagues, a few participants explained that it was not that they had intentionally maintained distance from certain people but that they simply did not have much opportunity, other than a monthly staff meeting, to befriend some of them.

A visual presentation of the friendship network among the participants is depicted in Figure 1a. Nodes at different locations are represented with different shapes. In the lower right-hand corner of the diagram are five round nodes depicting the 5 employees working in the main office. Among them, 4 employees are friends with each other. Meanwhile, they all are well connected with other employees working in different locations. Although Participant 10 works in the main office and has more opportunities to socialize with others, nobody—including both co-located and distributed participants—mentioned her as a friend. In contrast, among distributed employees, with a few exceptions including Participants 7, 9, and 13, most had significantly fewer friends among either people in the main office or in other field stations. Also note in Figure 1a that the size of the nodes varies with the node’s betweenness centrality score. Betweenness centrality measures the extent to which a node lies on the shortest path between any two nodes (Wasserman & Faust, 1994). Conceptually, this property reflects a node’s capability to bridge relationships in a network. An interesting difference can be observed between Participant 11 and Participant 13 in their positions in the friendship network. They both have a high degree of centrality in the friendship network; however, these 2 participants are very different in their betweenness centrality scores. Participant 13 ranked the highest in betweenness centrality because in comparison to Participant 11, she has many more connections with distributed employees who do not have as strong connections with the main office. Possibly, she identifies more with the needs of distributed employees and therefore develops more friendships with those working under similar geographic constraints.

Differences between friendship and knowledge-seeking networks. As reviewed earlier, previous research has found that people are more likely to obtain quality information and advice when in close relationships supported by strong ties (Krackhardt, 1992; Reagans & McEvily, 2003). Following this precedent, we further investigated the correlation between friendship and knowledge-seeking networks using the QAP function in UCINET (Borgatti, Everett, & Freeman, 2002). Figure 1b provides a visual presentation of the knowledge-seeking network. As in Figure 1a, the nodes in the knowledge-seeking network are coded by location, and the size of a node reflects its betweenness centrality in the network under investigation. In comparison to the friendship network, the knowledge-seeking network is much denser and has no isolate. Because both networks collected data on directional relationships (e.g., A seeks B’s knowledge, but not vice versa), each network had 182 dyadic relationships. A correlation analysis was conducted in UCINET using the QAP function because this network-analysis procedure adjusts for within-subject interdependence in the data when dyadic relationships are nested within individual persons. The result showed that friendship and knowledge-seeking networks correlated significantly with each other ($r = 0.483, p < 0.05$), indicating significant overlap between the two types of network ties; however, there were situations where the two types of networks did not overlap, and social interactions were kept strictly professional with no further friendship. For instance, as shown in Table 2, Participant 10 ranked fifth, along with 3 other participants, in the knowledge-seeking network; however, she was found to be the only isolate in the friendship network. In separate network data that we collected to examine adversarial relationships at the workplace, she was 1 of only 2 employees disliked in the whole group. The impact of adversarial relationships on knowledge seeking has not been widely studied until recently. Yang and Tang (2003) defined adversarial relationships as “...relations that may involve negative exchanges which cause emotional distress, anger or indifference...” (p. 97). Sparrowe, Liden, Wayne, and Kraimer (2001) showed that being disliked by other teammates was negatively related
FIG. 1. (a) Friendship network, and (b) knowledge seeking network. Different shapes of the node represent different locations. The size of a node is determined by its normalized betweenness centrality score, with large size indicating high betweenness centrality in the friendship network.

to individual job performance and information exchange because those who were disliked would be “potentially cut off from the natural flow of information through the grapevine” (Baldwin, Bedell, & Johnson, 1997, p. 1374). On a positive note, many of her colleagues approached her for advice, and it was obvious from our interview that she is very competent and passionate about her career. She also is well connected to both professors ($n = 9$) and specialists ($n = 5$) in obtaining external resources. On the other hand, it is unclear how much more her colleagues could have benefited from her external connections had she been considered more likeable.

Regarding the second disliked person in the office, Participant 8, qualitative analysis of the interview transcripts
TABLE 2. Degree centrality and betweenness centrality of friendship and knowledge-seeking network.

<table>
<thead>
<tr>
<th>Case ID</th>
<th>Friendship network</th>
<th>Knowledge-seeking network</th>
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</table>

revealed an interesting difference between him and Participant 6 in how they described their respective access to expertise in Knowledge Domain Y. Expertise in Knowledge Domain Y was identified by many, including both Participants 6 and 8, as crucial for successful completion of their tasks. Participant 8 expressed disappointment in finding competent persons in this focus area to help him because a professor, his only source in this focus area, had become less accessible after taking an administrative job. In contrast, Participant 6, who also has had long tenure at the office and at the research university, mentioned that even for a more specialized area of research under Knowledge Domain Y, there exists a network of 30 people that she can consult via mass e-mail on a variety of issues, including new situations she confronts in the field. It is premature to claim that differences in friendship-network positions predict differences in knowledge-seeking networks; however, note that Participant 8 received the second-lowest score (7.69) in the friendship network, confirming what we have observed in the more direct measure of adversarial relationship, while Participant 6’s degree centrality in the friendship network was 38.46.

Given the nature of tasks that the office undertakes, maintaining ties with external resources is crucial. Although many employees mentioned that they try to choose to work with people they like, it is nearly inevitable that they will encounter at least a handful of individuals with whom they have difficulty communicating. According to the interviews, these not-so-pleasant relationships may greatly influence the knowledge-seeking behavior of the respondents. For example, Participant 11, the most connected person in the office, noted that a certain professor “… can be a very good source of information, if you catch him on the right day. I mean he knows so much stuff but he is not always easy to catch.” Participant 1 described one professor as “intimidating;” while she trusted this individual’s expert knowledge, she would not approach her unless absolutely necessary. A few participants find they can never get responses from particular professors. All these interpersonal issues at times contributed to the educators’ difficulty in finding their desired information and expertise. As a result, some of them may choose to contact the experts only when necessary or to look for other available backup sources.

In sum, consistent with previous research, both interview data and the QAP analysis revealed that social relationships were crucial for gaining access to knowledge both inside and outside the office. Although unintentional, the development of strong interpersonal ties can be difficult among distributed employees, particularly those junior employees who have not had much chance to build diverse network ties through joint projects. As shown in Figure 2, senior personnel had a significantly larger number of network contacts for knowledge retrieval. Hence, it is not surprising that senior personnel, who also were more likely to be better connected, functioned as knowledge “gatekeepers.” In addition, strong evidence was found in the interview data that being disliked not only prevents the focal person from accessing expert knowledge, but also prevents others from accessing his or her expert knowledge.
knowledge. The differences in pattern and density between the friendship and knowing-seeking networks also reveal the possibility that the organization’s full intellectual resources may not be fully utilized when colleagues, particularly junior ones, are not comfortable “hanging out” with difficult senior persons to seek and learn tacit knowledge through observation. Taken together, these findings highlight the need for more research attention on strategies to reduce knowledge inaccessibility due to interpersonal issues.

**Q2: Different Characteristics of Knowledge Versus Different Task Requirements**

As reviewed earlier, one of the most frequently studied topics in knowledge-seeking research is how different characteristics of knowledge (Hansen, 1999; Winter, 1987) or different task requirements (Cross & Sproull, 2004) interact with features of network ties to influence knowledge-seeking processes. Differing from Hansen’s (1999) research, we found no evidence from our interviews that people are more likely to obtain tacit, noncodified knowledge from strong ties and codified knowledge from weak ties. When the participants were asked whether the expert knowledge they sought was well-documented, explicit, or easily articulated, many requested further clarification. It did not appear that they were conscious of the distinction between the non-codified and codified classifications of knowledge. According to the participants, because much of the expert knowledge they seek is process-oriented, it is more difficult to represent this type of knowledge in documents; however, this explanation does not necessarily mean that this type of knowledge cannot be articulated and can be learned through only observation or apprenticeship with knowledge providers. Qualitative analysis of the interviews revealed that availability of documents plays a major role in influencing what types of knowledge participants can obtain, regardless of tie strength. Participant 1 described that one person she consulted was a junior faculty member who has extensive field experience, but simply does not have the time to produce articles or fact sheets to document her field experiences. In contrast, 2 senior professors whom Participant 1 has consulted on similar issues can provide her with more documents because they have had longer tenure on the job and also more support to document their findings. As Participant 1 described, while she is more likely to obtain documented expert knowledge from her senior knowledge providers than from her junior sources, she consults them with roughly the same frequency; moreover, she does not feel that her connections with them have made much difference in what form of expert knowledge she can obtain.

Similar to Cross and Sproull (2004), we found that knowledge seeking is more likely to be driven by the nature of tasks. Senior professors are more likely to be contacted to check facts, and to learn about relevant new research and state legislation, for instance, while community educators are more likely to be contacted to find out what is actually happening in farmers’ fields. In addition, local experts are more likely to be consulted than distant ones when the knowledge seekers have actual objects such as physical specimens to show. While having friendship ties with knowledge providers are important considerations in deciding whom to consult, as described earlier, participants did report “cold calling” when nobody in their immediate social networks had the needed expert knowledge. Overall, task requirements seem to be the dominant factor influencing knowledge seeking. To accomplish a task, participants showed great agency and resourcefulness to bypass social or geographic constraints.

**RQ3: Using Electronic Resources**

While previous research has found that technical competence increased the usage of electronic resources for needed expert knowledge (Yuan et al., 2005), we did not find it a major factor influencing searching for codified knowledge online in this study. One reason that may account for this difference is that all of the participants in this study are well educated. Besides having at least a Masters degree, all participants reported having adequate computer skills to search for needed knowledge from electronic resources (with an average of 5.8 on a 7-point Likert scale). In many cases, participants said that they would start knowledge seeking from electronic resources only if they assumed the question was beyond the expertise areas of anyone in their social network. Moreover, these individuals would go to these electronic resources directly if they know they would be able to locate certain documents.

While many reported that electronic resources are an easy starting point for locating needed information, the credibility of information obtained from these resources varies tremendously. Electronic academic articles, governmental statistics, and other official reports are sources of information the participants can trust; however, doubts are widespread about the credibility of the general information obtained from the Internet, particularly when the information comes from commercial (“.com”) Web sites. When they are unsure of the credibility of the Internet information, besides double-checking with their colleagues as well as third sources, employees will also look through the context of the website to search for possible cues. For example, respondents mentioned the importance of knowing the website authors personally, or by reputation, or making sure that information was accurate (e.g., displaying the correct Latin names for plant species). Participants’ concerns about the credibility of knowledge provided online by non-academic or non-governmental sources confirms our proposition that knowledge seeking in the Information Age requires leveraging both electronic and human resources, which is the key focus of our next research question.

**RQ4: Making a Choice**

Considering the participants’ extensive use of the Internet, the question of when individuals look on the Internet versus when they consult with people becomes very relevant.
Although participants demonstrated a high level of competency in using the Internet, most of them admitted that relying solely on the Internet for needed knowledge would make their job much more difficult. Many factors come into play in choosing between the Internet and people for knowledge seeking. Consistent with predictions from previous media-choice studies, one of the most important considerations regards the complexity of the question/task (Daft & Lengel, 1986). If the answer the respondent seeks simply involves background information or the answer to a “quick question,” searching on the Internet becomes more likely than seeking a specific person. With search engines such as Google Image, identifying particular insects or plants can be particularly fast and simple. As Participant 6 noted, “I use the Internet a lot for quick answers; sometimes it’s just quicker to pop something into Google than it is to go to somebody.” On the other hand, when it comes to more complex questions (e.g., those that involve process, opinions, and decision-making), knowledge from the Internet becomes less helpful and can fail to provide the detailed context required to make further judgments. In this case, getting expert knowledge from other people provides a more nuanced, hands-on perspective and can integrate other peoples’ experiences and evaluations. For instance, Participant 10 stated that while the Internet is great to check “objective information” about a product such as fertilizer, she is “more likely to consult a faculty member or a colleague in another state” if she wants an outside opinion about the effectiveness of the product. Those seemingly simple knowledge-seeking tasks that can be easily done via the Internet, such as checking facts, seeking referrals, learning about new research development, and so on, can be turned into complicated knowledge-seeking tasks that require the support of interpersonal connections to obtain expert judgments about whether the numbers indeed make sense or whether the referrals can lead to valuable advice.

The second factor influencing the choice between interpersonal and electronic resources is whether the expert knowledge seeker is looking for general versus specific knowledge. A few participants chose to search online for answers to general questions for which they lacked the appropriate background knowledge. As Participant 11 mentioned, “If I’m totally unfamiliar with [the subject matter] and I don’t have resources on my bench here, [going on the Internet] is certainly becoming a very easy way to do so.” However, if knowledge seekers are looking for very specific knowledge such as state legislation or localized plant diseases endemic to the state, they will often choose to go to a person. For instance, Participant 1 stated that “I’m probably less likely to use the Internet if I know I need to make sure that I am finding (state)-specific information.” Participant 11 said that he could seldom find specific information on the Web site about the generalizability of the information: “…how far can you use the information you are seeing? Under what conditions will it work and what conditions will it not work, and what are the concerns that you should be considering?” As a result, the Internet is often used to locate general information.

Contextual constraints, including time pressure, cost, and geographic location, is the third factor influencing the choice. Participants said that they might choose to go online because of the relative efficiency and low perceived cost. As Participant 7 said, “It’s always harder to get in touch with a colleague than it is to find something on Google.” Some of the educators mentioned that they almost always begin a research project with a basic Google or Yahoo! search because these searches are easy, fast, and can provide an quick answer. However, if Google’s top recommendation is a .com site, participants would utilize their social network to judge the quality of the information. Location is another factor influencing the choice between interpersonal and electronic resources. Finding images online or exchanging pictures through e-mail are common ways participants use to identify what they find in the field if they do not have a colleague nearby with whom they can consult. Overall, we found that employees’ use of different communication media is primarily task-driven. They showed great agency to make the best use of the resources they have to overcome different contextual constraints.

Results Validation

As a part of a larger project to study employees’ knowledge-seeking behavior, we conducted 10 additional interviews with peer educators to corroborate and explore the generalizability of the results of this study. These interviewees were recruited at a widely attended state agricultural convention. As shown in Table 3, these individuals worked in different offices, had different organizational tenures with the university, and occupied different positions. In addition, in attempts to discern differences and similarities between producers’ and educators’ knowledge-seeking behavior, we also interviewed 25 dairy farmers (18 male, 7 female) about where they locate necessary knowledge for their production enterprises and how they choose between interpersonal and electronic sources. Of these respondents, experience in farming ranged from 3 to approximately 70 years, with an average of 32 years. During all of these supplementary interviews, respondents were asked the same questions about how and where they located needed knowledge, and how they chose between interpersonal and electronic sources to gather this knowledge. Despite differences in study contexts, the interviews confirmed most of the findings about knowledge seeking that were discussed earlier, except those that require the collection of complete social-network data (for more details of the specific findings from these additional interviews, see Appendix C).

Conclusion

This research considered how co-located and distributed employees seek knowledge through interpersonal and electronic resources. The topic is timely because expert knowledge is one of the most important resources influencing employees’ performance in an information age (Drucker, 1999). Yet, locating needed knowledge can be challenging...
TABLE 3. Demographic information of additional interviews for results validation.

<table>
<thead>
<tr>
<th>Case ID</th>
<th>Gender</th>
<th>Job position/affiliation</th>
<th>Tenure (years)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>M</td>
<td>Liaison between the university and county offices; former county director</td>
<td>Unknown</td>
</tr>
<tr>
<td>2</td>
<td>F</td>
<td>Educator in the dairy business management program</td>
<td>&lt;1</td>
</tr>
<tr>
<td>3</td>
<td>M</td>
<td>Agricultural economic development specialist</td>
<td>12</td>
</tr>
<tr>
<td>4</td>
<td>F</td>
<td>Association issue leader, county office</td>
<td>24</td>
</tr>
<tr>
<td>5</td>
<td>M</td>
<td>Senior associate, dairy, livestock, and field crops team</td>
<td>9</td>
</tr>
<tr>
<td>6</td>
<td>M</td>
<td>Director of a leadership training program for producers and others affiliated with in-state agriculture</td>
<td>9</td>
</tr>
<tr>
<td>7</td>
<td>M</td>
<td>Support specialist; expert on medical insurance</td>
<td>2</td>
</tr>
<tr>
<td>8</td>
<td>F</td>
<td>Horticulture program educator, county office</td>
<td>11</td>
</tr>
<tr>
<td>9</td>
<td>F</td>
<td>Executive director, county office</td>
<td>10</td>
</tr>
<tr>
<td>10</td>
<td>F</td>
<td>Communications specialist; works to disseminate information about the work of entire organization to all state stakeholders (e.g., residents, legislators, etc.)</td>
<td>3</td>
</tr>
</tbody>
</table>

When expert judgment is needed to sift through a plethora of sources to locate and retrieve appropriate, credible knowledge. In this study, we used mixed methods, including interviews, surveys, and social network analysis, to study knowledge seeking from inside and outside an educational office that consists of both co-located and distributed employees. The goals of the research were to reveal oversights in existing information science and management research on knowledge-seeking activities in organizations, and to develop guidelines to help employees better leverage interpersonal and electronic resources to gain actual access to knowledge. In the following section, we discuss both conceptual and practical implications as well as the limitations of the study.

**Conceptual Implications and Directions for Future Research**

While the research confirmed many previous theories and findings on knowledge seeking, it also revealed some unexpected findings, highlighting two main areas of research that deserve more attention.

**Strength of network ties and types of knowledge obtained.**

As reviewed earlier, some existing knowledge-seeking research has found that people obtain different types of knowledge (i.e., tacit/noncodified vs. explicit/codified) knowledge depending on the strength of network ties (e.g., Hansen, 1999). In our study, however, we observed that (a) our participants did not find this classification particularly useful, given their experience; and (b) availability or accessibility of knowledge played a larger role because in many situations, they had to take whatever was available/accessible.

The first finding motivated us to reflect further on the existing categories used to classify different types of knowledge. The information and knowledge-management literature has found many overlapping, seemingly different definitions of terms. For instance, the differentiation between data, information, and knowledge overlaps to a certain extent with the classification of tacit versus explicit and noncodified versus codified knowledge. While the ultimate goal of this research was to study how employees seek needed intellectual resources to complete their task, in alignment with the current knowledge-management literature, we perceive that seeking information is similar to seeking codified knowledge; and seeking expertise, noncodified knowledge that requires more explanation and sharing of experiences. In our study, however, we observed a complex “dance” between information seeking and expertise seeking when the employees described how they obtained needed knowledge to complete their tasks. While the Internet is a handy tool to locate factual information/codified knowledge, employees suggested that a simple information search can turn into complicated expertise-seeking when the information online needs to be interpreted in context. For example, is the situation described on a Web page identical to what they have observed in the field? To what extent can what has been observed on a farm in Ohio be applied to a farm in New York? Is the information/codified knowledge found online accurate? Does it really represent new discoveries? All these judgments about the accuracy and newness of information require expertise. In sum, we found close connections between information seeking and expertise seeking or between seeking codified and noncodified knowledge in actual practice because both information and expertise seeking can happen during one search, and checking facts and seeking referrals also require expert judgment about whether the data or information received is valuable. Taken together, the results suggest that while it is logical to differentiate information seeking and expertise seeking in scholarly research, in reality, such a classification is of limited practical value for knowledge seekers who need both information and expertise.

Worthy of further discussion is the importance of documenting/codifying new knowledge. In this study, because the community educators are constantly confronting new situations/cases throughout the growing season, extensive and timely documentation of what is happening in the field is almost impossible. However, because documented expert knowledge is easier to share, it is important to develop (technical) tools or protocols to facilitate timely documentation of constantly evolving expert knowledge to deal with...
constantly evolving challenges because newly developed knowledge needs to be documented regardless of practical difficulties. In addition to ease of sharing, a second benefit of documenting new knowledge is that it can facilitate knowledge seeking among both liked and disliked employees. Both direct observation of adversarial ties and indirect comparison of the patterns and densities of friendship and knowledge seeking networks revealed that interpersonal issues can cause difficulties in knowledge seeking as well as insufficiency in knowledge retrieval. While not all knowledge can be documented, the implementation of relevant protocols on documenting knowledge and also on sharing the documents nevertheless can increase accessibility to knowledge of those competent experts who are, unfortunately, also intimidating, particularly to junior employees.

Finally, taken together, the findings also suggest the need for more integrated investigation on factors that influence knowledge seeking. As discussed earlier, in previous studies, Hansen (1999) focused more on characteristics of knowledge while Cross and Sproull (2004) focused more on task characteristics. There is no doubt that more research is needed to explore possible overlaps or integrations between the two approaches to resolve to what extent characteristics of knowledge and task requirement interact with features of network ties to influence knowledge seeking. Yet, the two lines of research also share a common oversight in that neither has paid attention to availability/accessibility of knowledge. Along with the results from a number of other studies (e.g., Culnan, 1985; Lu & Yuan, 2011; Yuan, Carboni, & Ehrlich, 2010), the findings from this study seem to suggest that availability/accessibility need to be controlled before examining which features of network ties and/or of tasks will influence access to which types of knowledge. We believe that taking into consideration of such contingency factors can help to develop a more comprehensive model of knowledge seeking.

*Better theorization about the issue of choice.* One of the major objectives of the current study was to examine how people choose between interpersonal and technological sources for knowledge seeking and to what extent the two sources complement each other in the process. In this study, we found that participants were very goal-oriented. They tried to optimize what was available, and often used multiple sources—both interpersonal and electronic means—to seek and validate the information they obtained. On one hand, we did not obtain a clearer picture about the preferred medium for knowledge seeking for different purposes. For instance, e-mail and the telephone were used more often when geographic distance existed; the Internet was used for quick searches; and electronic documents from academic, governmental, and community education sources were retrieved when the knowledge providers were not accessible due to personality traits, time constraints, and so on. On the other hand, we also found that previous theories on the usage of information and communication technologies provide only limited guidelines. Partial support for media richness theory (Daft & Lengel, 1986) was found in that characteristics of tasks did influence participants’ media choices as predicted by the theory, but participants showed more agency than what the theory has prescribed as they mobilized all sources possible to reach credible sources when needed. We did not find strong support for the social influence model (Fulk, 1993), which focuses on how social norms influence this process, in comparison to some earlier studies (e.g., Yuan et al., 2005).

As employees are divided in subproject groups and memberships in each group change with projects, the norm of media use in the office became more fluid. In addition, being an open system, a project group also often involves personnel outside the office. Consequently, a permanent norm does not form easily in this group, which may explain the finding of weaker influence of norms in this study. This finding suggests an interesting area of research to further extend the social influence model of technology use: How does a (swift) norm form in a project group to influence decision-making, including the decision about the usage of communication technology?

Taken together, the lack of full support for either theoretical camp presents an exciting research opportunity. Both additional theory development and field research are needed on how source choices are made to better support effective knowledge seeking. As reviewed earlier, knowledge can exist in both codified and noncodified forms. While codified/digitized knowledge is easier for distribution, codifying/digitizing knowledge is not costless to knowledge providers. Moreover, because having too many choices can be as counterproductive as having too few choices, it is important that both scholars and practitioners gain a clearer understanding of seekers’ source choices to help avoid providing wasted resources in producing knowledge in forms that have limited demand.

*Practical Implications*

The difference in network densities between the friendship and knowledge seeking networks reveals an unrealized potential of expert knowledge exchange among group members. Because participants expressed a strong inclination to approach their friends first for needed expert knowledge, it seems that a possible effective strategy to boost knowledge management is to foster friendship ties among colleagues to facilitate knowledge seeking and knowledge sharing. In this study, distributed employees reported more difficulties in forming friendship ties than ties among colleagues in facilitating knowledge sharing. This study, distributed employees reported more difficulties in forming friendship ties among colleagues due to the lack of opportunities for social interaction. Meanwhile, we observed that many of the distributed employees have junior status. Distance and comparatively lower levels of work experience have made it more challenging for these employees to seek expert knowledge from diverse sources. To overcome these hurdles in managing organizational knowledge, it seems that management needs to be strategic in deciding who works in distributed locations. It may be more effective from the perspective of organizational knowledge management to only hire or allow senior personnel to work at distributed locations. Alternatively, management needs to make a conscious effort to involve distributed employees in projects, meetings,
and events led by senior personnel to facilitate junior employees’ integration and socialization with others because projects, meetings, and events are key avenues identified by senior personnel as providing important opportunities for networking.

**Limitations**

When using qualitative methods, the researcher must be aware of several considerations. First, consulting with “community gatekeepers” prior to conducting the research may further increase trust and build rapport between the researcher and the participants (Sieber, 1998). Second, adapting a more structured, close-ended style of interviewing in some cases may limit the information available from a more in-depth, less structured form. Third, the researcher must consider credentials and even appearance as potential barriers to gaining entry and to eliciting thoughtful responses to potentially sensitive questions (e.g., Young, 2004). Finally, while many qualitative methodologists advise against self-disclosure of the researcher (e.g., Weiss, 1994), with the thought that so doing redirects attention away from the respondent, certain well-timed and appropriate “slips” also may gain both the attention and respect of respondents.

Applying these considerations to our case, finding the time and space to interact with organizational affiliates prior to the study may have increased our credibility and standing among participants and afforded us a deeper understanding of the organizational culture. Establishing greater rapport (e.g., through face-to-face visits and/or participant observation) prior to the study may have eased the nervous tension we routinely encountered when asking participants to describe their personal relationships within the organization. Despite one interviewer’s experience in agriculture and community education, we were at times perceived as organizational “outsiders”—and often with concerned suspicion. In a few cases, however, disclosing this background did appear to “win over” skeptical respondents, thus affording us more trust and support in our endeavor. While conducting semistructured interviews conferred the benefit of greater similarity across interviews, we may have been able to elicit more of the “thick, rich description” championed by qualitative researchers with a less structured format. That said, additional interviews with 10 individuals working in similar professions as well as 25 producers that these educators serve were conducted during one of their largest annual professional gatherings. Similar interview questions were asked, coupled with more open-ended probing. These additional interviews did not reveal new findings about how employees in similar community organizations balance interpersonal and electronic resources to search for needed knowledge for their job. While generalizability of results is not a typical concern for qualitative case studies, finding similar results from these additional interviews did increase our confidence in our earlier analysis and also signaled a diminishing need to collect additional interview data (i.e., theoretical saturation: see Glaser & Strauss, 1967).

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**References**


Appendix A

Interview Protocol

1. How many years have you been working as an educator? (Probe to discern whether this has been at same or different institution, substantive focus of program(s), etc.)

2. What would you say is your main program responsibility in your current position? (Probe to explain daily responsibilities, types of tasks and projects, etc.)

3. What kinds of subject area expertise do you need to know to complete your daily job duties? For instance, do you need to know insect biology, plant pathology, etc.?
   - How would you rate your expertise level in the areas you mentioned? (Probe to explain answer and to give examples, if applicable.)

4. If you had a question in one of the subject areas you mentioned earlier, where would you go for help or expertise?

   For instance, would you approach a colleague, search the Internet, etc.?
   - (Probe for particular names of individuals and their institutional affiliations, job titles, etc.)
   - What kind of information do you get from (insert name of person)? For instance, is it written down? A passing conversation in the hallway? Well-thought-out, polished memo? etc. (Ascertain whether primary means of communication is face-to-face, e-mail, phone, or some combination).

5. [If respondent uses the Internet for work-related information-seeking] How do you decide whether to go to the Internet or to approach a person to answer your question?
   - How do you decide whether you can trust what you find? (Probe for specific examples, if possible).
Appendix B

Questionnaire

1. Please place a check after name of the person if the description is correct:

<table>
<thead>
<tr>
<th>Name of Employee</th>
<th>Description</th>
<th>How much do you generally like this person?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Employee 1</td>
<td>This person has been an important source of professional advice, whom you approach if you have a work-related problem or when you want advice on a decision you have to make.</td>
<td>1 = Dislike a lot, 2 = Dislike slightly, 3 = Neutral, 4 = Like slightly, 5 = Like a lot</td>
</tr>
<tr>
<td>Employee 2</td>
<td>This person is someone whom you consider to be a personal friend, that is, a person you see most frequently for informal social activities such as going out to lunch, dinner, drinks, visiting one another’s homes, and so on.</td>
<td>1 = Dislike a lot, 2 = Dislike slightly, 3 = Neutral, 4 = Like slightly, 5 = Like a lot</td>
</tr>
</tbody>
</table>

2. In responding to the following items, keep in mind activities that you have worked on in the last week. Please rate yourself using a seven-point scale with 1 meaning “strongly disagree” and 7 meaning “strongly agree.”

_____ In most cases, I have the knowledge I need to make decisions.
_____ I have enough knowledge to meet my professional objectives effectively.
_____ The amount of information available to me is sufficient for me to make good decisions.
_____ Most information I receive is very valuable.
_____ I have found that information is generally complete enough for me to make good decisions.
_____ I have full confidence that I make decisions based on accurate information.

3. Task interdependence: Please rate yourself using a seven-point scale with 1 meaning strongly disagree and 7 meaning strongly agree.

_____ I work closely with other organization personnel in doing my work.
_____ I frequently must coordinate my efforts with other organization personnel.
_____ My own performance is dependent on receiving accurate information from other organization personnel.

4. Which Web site(s) do you frequently visit to search for information related to your program? (Please list the sites below.)

5. Please rate yourself about your proficiency in using the Internet using a seven-point scale with 1 meaning “strongly disagree” and 7 meaning “strongly agree.”

_____ The way I perform my job has a significant impact on other organization personnel.
_____ My work requires me to consult with other organization personnel fairly frequently.

Age

Highest education level

Major for the highest degree
Appendix C

Findings from the additional interviews confirmed most of our findings from the case study:

(a) The Internet when typically their first choice for expertise seeking, although its credibility needs to be validated.

I have been in industry, so it’s very easy for me to filter information [on the Internet] when they want to sell me about something . . . They may sell the consumers with a bunch of BS, but I have done enough research, so it’s quite easy for me to filter information. (Educator 5)

Because I graduated from [this university], I really appreciate [the university’s] website. Probably the university-associated websites I will trust. You can tell whether a website is backed up by something. (Educator 3)

(b) Interpersonal resources are frequently called upon when judgment calls are needed.

A farmer called me, and she sells chicken at farmers’ market, [and she] wanted to know, “. . . Can I cut up the chickens and re-package them . . . Is that legal?” It would be difficult for the farmers to call a regulatory person, because in that case, they are afraid that a regulatory person would show up and start suspecting the operation. So they call me, knowing that I would know the answer and be kind of anonymous. So I was able to call a food safety inspector . . . and the food safety inspector is going to tell me the truth, because they know I am accountable. (Educator 3)

(c) Senior personnel are very likely to function as expertise gatekeepers for junior personnel.

I would definitely go to [respondent’s direct supervisor] first. Just because I know her and she is involved with us. (Educator 2)

(d) The Internet is more likely to be used for “quick” answers, rather than to answer more far-reaching questions.

It depends on the issue [whether respondent goes to the Internet or to a colleague]. If the issue is going to have significance, like financial impact on farmers, I want to make sure [I trust] the person behind the materials. If it’s something, like I want to identify a bug, a yes/no question, then I would more likely turn to a website. (Educator 4)

(e) Interpersonal relationships can influence expertise-seeking.

. . . In a lot of situations, people are so busy, so you feel intimidated to call someone. For example, in our office there is a vegetable specialist, so I call him immediately if I have a question. Even if the question is kind of not his thing, I will call him because I know him. I know that he does not mind answering my question. He is open to anything [if] he can help. I know some people are just like, “I do not want to be bothered by answering that kind of question. I am so busy and I only have this kind of responsibility.” (Educator 8).

Though we lack complete social network data from these additional participants to compare and contrast with the case study, consistent findings from this diverse population allow us stronger confidence in the validity and generalizability of our findings on how employees balance online and interpersonal resources for expertise seeking.