2006

Virtual study groups: A challenging centerpiece for "working adult" management education

Gregory B. Northcraft

Terri L. Griffith
Santa Clara University, tgriffith@scu.edu

Mark A. Fuller

Teaching and Learning with Virtual Teams

Sharmila Pixy Ferris
William Paterson University, USA

Susan H. Godar
William Paterson University, USA

INFOSCI Information Science Publishing
Hershey • London • Melbourne • Singapore

Acquisitions Editor:	Michelle Potter
Development Editor:	Kristin Roth
Senior Managing Editor:	Amanda Appicello
Managing Editor:	Jennifer Neidig
Copy Editor:	Bernard J. Kieklak, Jr.
Typesetter:	Diane Huskinson
Cover Design:	Lisa Tosheff
Printed at:	Yurchak Printing Inc.

Published in the United States of America by
Information Science Publishing (an imprint of Idea Group Inc.)
701 E. Chocolate Avenue
Hershey PA 17033
Tel: 717-533-8845
Fax: 717-533-8661
E-mail: cust@idea-group.com
Web site: http://www.idea-group.com

and in the United Kingdom by
Information Science Publishing (an imprint of Idea Group Inc.)
3 Henrietta Street
Covent Garden
London WC2E 8LU
Tel: 44 20 7240 0856
Fax: 44 20 7379 0609
Web site: http://www.eurospan.online.com

Library of Congress Cataloging-in-Publication Data

Teaching and learning with virtual teams / S. Pixy Ferris and Susan Godar, editors.
p. cm.
Summary: "This book investigates issues around teams in the virtual and hybrid classroom, offering a view of current research and practice on the subject of virtual and collaborative teams in teaching and learning"--Provided by publisher.
Includes bibliographical references and index.
ISBN 1-59140-708-7 (hardcover) -- ISBN 1-59140-709-5 (softcover) -- ISBN 1-59140-710-9 (ebook)
1. Group work in education. 2. Team learning approach in education. 3. Teaching teams. 4. Distance education--Computer-assisted instruction. I. Ferris, Sharmila Pixy. II. Godar, Susan Hayes, 1948-
LB1032.F39 2005
371.39'5'0285--dc22
2005020631

British Cataloguing in Publication Data
A Cataloguing in Publication record for this book is available from the British Library.

Chapter VI

Virtual Study Groups:
A Challenging Centerpiece for “Working Adult” Management Education

Gregory B. Northcraft
University of Illinois, USA

Terri L. Griffith
Santa Clara University, USA

Mark A. Fuller
Washington State University, USA

Abstract

Groups and teams are critical to modern organizations, and consequently management education has incorporated groups as a centerpiece of both content (the study of group process) and process (the use of study groups and group projects). Unfortunately, working-adult educational programs appear to have yet to take an important final step — acknowledging that study groups often interact virtually and then providing support for *virtual study group interaction. We provide both theory and data concerning the use of study groups as virtual teams. We believe that there are important benefits to be gained when study groups make educated decisions about the design and process of their virtual interaction.*

Introduction

Groups and teams have emerged as a central building block of modern global commerce (Devine, Clayton, Philips, Dunford, & Melner, 1999), with as many as 80% of Fortune 500 companies having a majority of their employees involved in work teams of one sort or another (Cohen & Bailey, 1997). The reliance of modern business organizations on teams reflects a growing understanding that the interaction opportunities provided by group settings offer advantages for both organizations and their employees. Teams provide a vehicle for employee inclusiveness that enhances organizational effectiveness (Griffith & Neale, 2001). As Lawler (1999, p. 18) emphatically noted, "The results are in: teams are more popular in the United States workplace, and employee involvement (EI) leads to better business performance."

In concert with this apparent shift of emphasis in business to teams has been a corresponding emergence of teams as a centerpiece of cooperative education (e.g., Chen, Donahue, & Klimoski, 2004; Michaelson, Jones, & Watson, 1993; Schmuck & Schmuck, 1997). Stunkel (1998) identified an increasing use of teams and groups as one of the predominant trends in higher education. Teams have proven to be an excellent vehicle for accomplishing interactive, cooperative instruction (Lengnick-Hall & Sanders, 1997). Research has shown that students learn most effectively when working in groups, where they can verbalize their thoughts, challenge the ideas of others, and collaborate to achieve group solutions to problems (Deutsch, 1962; Johnson & Johnson, 1989, 1994).

In this chapter we focus on a particular use of teams in higher educational settings — the study group. In particular, we focus on the likely effects of study groups that meet virtually, and present some empirical evidence concerning the effects of virtual study group interaction patterns on study group effectiveness. We close with some recommendations about how to manage instruction design in order to maximize the benefits of virtual study groups.

What Study Groups Have to Offer

Study groups have become a centerpiece of graduate management education, such as MBA and Executive MBA programs (Baldwin, Bedell, & Johnson, 1997; Byrne, 1995). The emphasis on study group interaction in such programs reflects three critical benefits that the use of study groups brings to the table.

Intellectual Cross-Pollination

When study groups are appropriately strategically composed (e.g., when study group members have different backgrounds and thus distinct strengths), the diversity of skills and background experience represented in the study group can allow stronger students in one discipline to share their strengths and thus help the study group's weaker students in that discipline. Further, when the study group changes its focus to a new discipline, those same students can switch roles, allowing a previously "weak student" to lead and facilitate group learning. In this way, study groups provide the opportunity for diversity (Schneider & Northcraft, 1999) that can be leveraged for learning opportunities far beyond what students could get from personal contact with a professor. In effect, study groups co-opt students into taking responsibility for "co-producing" the education product (Lengnick-Hall & Saunders, 1997).

Group Dynamics/Leadership Skills

Study groups also provide students invaluable experience in learning how to manage groups effectively. Stevens and Campion (1994) have identified conflict resolution, collaborative problem-solving, communication, goal setting and performance management, and planning and task coordination all as critical competencies needed for a team — and a study group — to run effectively and efficiently. Study groups provide a setting in which these competencies can be rehearsed, refined, and routinized into students' skill sets. O'Neil, Allerd, and Baker (1997) note that these are skills highly prized by potential employers.

Social Networking

Study groups also provide an arena in which invaluable social networking can take place (Baldwin et al., 1997). Students cultivate strong relationships under the interdependence of study groups. Just as those relationships co-opt students into co-producing the educational product at school, they also represent a critical storehouse of potential information (different experiences and perspectives) for students to draw upon after graduation. The development of strong social network contacts during school can help ensure that learning (from each other!) continues to take place long after students have forgotten the names of their courses and their professors.

Study Groups in "Wording Adult" Management Education Programs

The three primary benefits of study groups outlined above — intellectual cross-pollination, group dynamics/leadership skills, and social networking — seem to represent a particularly important component of "working adult" management educational programs (e.g., part-time MBA and Executive MBA programs). In such programs, professorial contact hours are limited and study group work is intended to leverage that professorial contact. In terms of the three benefits of study groups outlined above, these students bring more to the table. They have more experience to draw upon — both in terms of the course content and in terms of their own past group dynamics/leadership experiences. In many cases these students also already have well-developed social networks of their own, which makes social networking with them even more "value-added."

Paradoxically, although study group-focused learning provides the most promise for working-adult students, it may also pose the most challenges. Study groups in full-time programs — such as a regular full-time MBA — probably meet face-to-face. For their working-adult counterparts, face-to-face meetings may seem an out-of-reach luxury. Rather, such groups are more likely to meet virtually.

Study Groups as Virtual Teams

Study groups become virtual teams when their primary means of interaction is not face-to-face (Lipnack and Stamps, 1997). As noted by Stunkel (1998), another of the trends in higher education is an increasing reliance on technology, and it is technology that makes it increasingly possible for teams to "meet" (interact) without being face-to-face (Griffith & Neale, 2001)—for example, using conference calls or Web-meetings (e.g., using Microsoft Netmeeting).

As Griffith and Neale (2001) note, there is a range of technologies used by virtual groups. These technologies vary by the level of communication and documentation support they provide. At the low end, one can imagine virtual groups using traditional mail in the same way that "correspondence chess" was played in the 1900s. More reasonably, our experience suggests that most student groups make heavy use of conference calls for their synchronous meetings, supplemented by e-mail for asynchronous coordination and document transfer. More adventuresome groups will make use of shared file servers (generally free ones, such as Yahoo! Groups). It is rare to find study groups using more sophisticated tools like those provided by WebEx, Groove, or Facilitate.com. Regardless of the particular technology adopted, groups will need to consider their own experience with the technology, each other, and the task as they make choices about how to meet and what technologies to employ (Carlson & Zmud, 1999).

Study groups can be intentionally arranged to encourage face-to-face meetings. For example, in the University of Illinois Executive MBA program, study groups historically have been formed on the basis of geographic proximity (for example, all the enrolled students from Bloomington, Illinois may form one study group) precisely to facilitate regular face-to-face study group meetings by minimizing the amount of travel required to meet between formal class sessions.

Unfortunately, the intention of arranging study groups to be physically proximal (and thus allow face-to-face meetings) may underestimate the primacy of convenience to very busy working adults. Lengnick-Hall and Sanders (1997, p. 1363), in their study of empowered student learning systems noted that, "…as more students find they must balance family and work demands and expectations with their student roles, the issue of expediency and convenience becomes increasingly important." Even when programs organize study groups geographically to facilitate face-to-face meetings, in reality students may still meet virtually because virtual meetings — no matter what the intervening distance — are easier to arrange than face-to-face meetings. If technology makes it possible for a student to be "at home" with the family while also meeting with a study group (e.g., via conference call or Web-meeting), the opportunity to be two places at once may prove too attractive for a working adult to pass up.

Composing study groups on the basis of geographic proximity to encourage face-to-face interaction may be ill-advised in any event. Geographically proximal students may come from the same employer (or share some regional culture biases), thereby limiting the potential for intellectual cross-pollination and social networking with individuals from other companies and even other industries. As one University of Illinois Executive MBA student put it, "I didn't join this program to socially network with other people from my own company!"

Composing study groups on the basis of geographic proximity to encourage face-to-face interaction may also limit the potential for intellectual cross-pollination and social networking by limiting the number of students with which a student can cross-pollinate and socially network during the program. For example, University of Illinois Executive MBA students occasionally have suggested that study groups be "rotated" (that is, reformed) at the conclusion of every two-month, two-course module. Rotation would increase the probability that every student in the program will have the opportunity to be in a study group — and thereby to intellectually cross-pollinate and socially network — with every other student in the program. To the extent that study groups offer intellectual and social networking value, rotating study groups seems to be the recipe for maximizing these values. Such a strategy, however, demands that geographic proximity *not* be allowed to drive study group composition. If instead study group composition is driven by the potential benefits of diversity, this diversity may be best achieved by having study groups meet virtually — so that location (geographic proximity of study group members) is not a consideration. If study groups meet virtually, however, are there unintended consequences?

The Limits of Meeting Virtually

If the point of study groups is to enhance intellectual cross-pollination, foster the development of group dynamics/leadership skills, and to develop social network connections, it seems significant that virtual interaction probably threatens the accomplishment of two of these objectives. Rockmann and

Northcraft (2005, p. 11) note that, "…the dispersion of team members across space and time can interrupt communication and erode any sense of group-ness or identity within a virtual team." Thus, virtual study groups may not accomplish strong intellectual cross-pollination because of disrupted information sharing, and may not develop strong social network connections because of degraded attachment among study group members. Further, both of these problems might be particularly likely to occur when convenience considerations drive study groups to "meet" asynchronously (for example, using round-robin e-mail to revise a group project write-up).

Disrupted information sharing. A primary characteristic of virtual interaction is the substitution of some form of technology-mediated communication (e.g., telephone, e-mail, Web-conferencing) for face-to-face interaction. McGrath and Hollingshead (1994) found that computer-mediated groups tend to have fewer interactions and less information exchange among members than face-to-face groups (Ramsower, 1985; Richter & Meshulam, 1993). Virtual team members can exchange verbal information as efficiently as a face-to-face team, but their ability to handle nonverbal exchange is severely limited, which can contribute to increased misunderstanding among members (Warkentin, Sayeed, & Hightower, 1997). Hewitt and Scardamalia (1998, p. 87) note that, "While online discourse may promote equality, it is arguably less conducive to maintaining an optimal level of conflict….Without the real-time, aural and visual cues of face-to-face discourse (smiles, nods, 'uh-huh,' and so forth), it becomes difficult for writers to know how their statements are being interpreted. 'Grounding a conversation'….is a difficult task across media that lack co-presence, visibility, audibility, and simultaneity…" In another study, face-to-face teams were also found to have better internal leadership and coordination than virtual teams (Burke & Chidambaram, 1999). Finally, research has demonstrated that virtuality may encourage individuals to be less open in their communication (Alge, Wiethoff, & Klein, 2003; Hollingshead, 1996). In all of these cases, meeting virtually may contribute to a disruption of effective information sharing among study group members.

Degraded attachment. Virtual interaction may also prove less likely to create the relationships required to foster valuable social network connections. Face-to-face contact has been found to be a primary driver of relationship development (Festinger, Schachter, & Back, 1950). Not surprisingly then, telecommuting research has found that telecommuters develop less organizational commitment (Kinsman, 1987), and experience increased feelings of isolation (Chapman, Sheehy, Heywood, Dooley, & Collins, 1995; Huws, 1993; Solomon & Templer, 1993). Virtual interaction may exacerbate feelings that others are not doing their share of the work (e.g., Broad, 1981) since their work is not as visible and is more difficult to verify (Graetz, Boyle, Kimble, Thompson, & Garloch, 1998). This inability to verify can decrease trust (Alge et al., 2003; Hollingshead, 1996), which is critical to the development of strong long-term relationships (Jarvenpaa, Knoll, & Leidner, 1998).

Finally, virtual communication may hamper the development of transactive memory within the group (Griffith, Sawyer, & Neale, 2003). Transactive memory is the capacity of group members to know who in a group knows what — that is, where (in which person) particular information expertise resides within the group (Wegner, 1987). This has implications for both the short-term and long-term value of study groups. In the short-term, effective co-production seems less likely to occur if study group members do not know where to turn to find the information they need. In the long-term, social network connections are only of value to the extent that study group members know what value (informationally) each individual in the network brings to the table.

The bottom line is that virtual interaction in study groups may lessen the effectiveness of the behavioral integration (Hambrick, 1994) required for effective intellectual cross-pollination and educational co-production. In addition, virtual interaction may also reduce the social integration (Smith, Smith, Olian, Sims, O'Bannon, & Scully, 1994) that provides the foundation for strong social network connections.

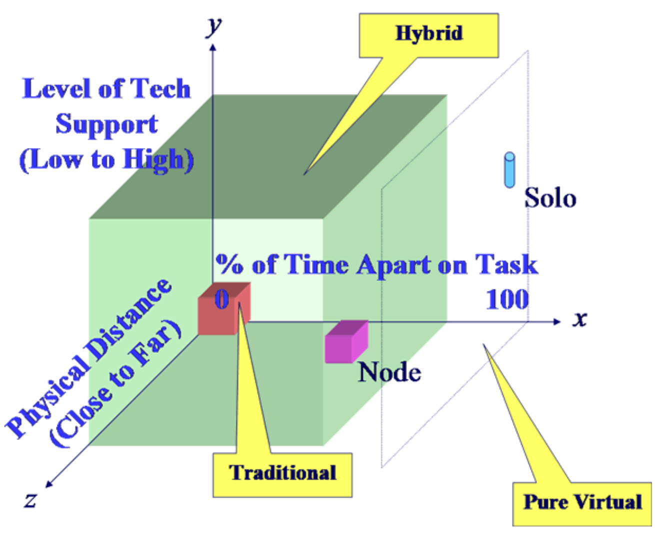
The Real Issue with Virtual Study Groups

The real issue with study groups may be not that virtual interaction is less effective than non-virtual interaction. Instead the real problem may be that study groups that interact virtually may be unlikely to interact with all members on an equal communication footing, and thereby may jeopardize the potential benefits of study group interaction. Virtual study group members may interact with one another in markedly different ways, and these different forms of interaction may influence the benefits that each member takes from the study group.

Johnson, Suriya, Yoon, Berrett, and LaFleur (2002) define virtual team interaction as interaction that is "geographically unrestricted." It is worth noting that this definition doesn't mean face-to-face interaction among virtual study group members isn't possible or even prevalent, just that it is *only one of many* possible options for interacting with other study group members. Griffith, Mannix, and Neale (2003) similarly note that virtual teams often contain a mixture of co-located and virtual members, such that virtuality represents a continuum rather than a dichotomy (Griffith & Neale, 2001). These comments raise the specter of "hybrid" virtual study groups. A hybrid virtual study group could be one in which the study group meets completely (all members) face-to-face sometimes, and meets completely (all members) virtually (synchronously or asynchronously) at others. However, a hybrid study group could also be one in which only some members are co-located during study group meetings, so that study group members might simultaneously communicate with some study group members face-to-face and some virtually.

Three distinct dispersion configurations of study groups are illustrated in Figure 1: traditional, hybrid, and pure virtual. The x-axis represents the percentage of work that the group does with its members distributed across time or space. The y-axis represents the level of technological support used by the team. Technological support (either electronic or otherwise) is largely about communication, but also includes documentation, and/or decision support capability. The z-axis represents the distribution of the physical locations occupied by the group members. As noted earlier, this dimension brings into play the tension between convenience and diversity. Purely virtual groups take up the plane depicted on the far right, regardless of the level/type of technological support they use. Purely face-to-face (traditional) groups form the other extreme and

Figure 1. Adapted from Griffith, Sawyer, and Neale (2003)



are depicted as the cube at the origin of the graph. Purely face-to-face groups do *all* of their work face-to-face and are expected to be rare, at best.

Between these two "pure" forms of study groups lies the problem: virtualness may vary not only *across* groups (some study groups utilize more face-to-face interaction than others) but also *within* groups (some study group members utilize more face-to-face interaction than others). When virtualness varies within a study group, it creates a non-level communication playing field. That means the connections among some study group members will be disrupted and degraded through the use of virtual interaction, while the connections among other study group members (those interacting face-to-face) will not be disrupted and degraded. This non-level communication playing field in turn raises the specter of subgroups, fault lines, and the marginalization of some study group members.

Virtual groups whose virtuality varies across group members are not uncommon. For example, Griffith, Mannix, and Neale (2003) studied teams at a large enterprise software firm. The 28 teams they studied ranged from fully co-located (13 teams) to an eight-person team with seven locations—and everything in between. Majchrzak, Rice, Malhotra, King, and Ba (2000, p. 574) provide another example: "Virtual team members were geographically distributed: two members were located in different ends of the same building, three other members were each one mile away in different buildings; one member of a second organization was located 100 miles away; and two members of the third organization were located 1,000 miles away in different buildings."

Prior research provides a variety of insights concerning the likely effects of subgroups created when some study group members are co-located and some are not. For example, in-group bias—social competition and discrimination against out-groups and favoritism towards the in-group (Mugny, Sanchez-Mazas, Roux, & Perez, 1991)—may play a key role. Intergroup communication can be affected if in-group bias distorts effective information sharing and mutual influence (Lee & Ottati, 1993). Recent work specifically focused on subgroups in distributed teams suggests the types of issues that may arise. Cramton (2002, p. 203) notes that, "there seems to be a tendency for dispersed teams to develop sub-group identities based on location." Members of a software engineering organization studied by Armstrong and Cole (2002) considered co-located team members as "us" and distant team members as "them." Distributed groups may be prone to develop cliques based on where they work, thereby splitting the group into multiple factions (Armstrong & Cole, 2002; Cramton, 2001; Hinds & Bailey, 2003).

As these examples illustrate, the geographical distribution of members of a group creates a possible “fault line” within the group (Rockmann, Pratt, & Northcraft, 2004). A fault line is a characteristic (for example, location) that segregates a team into subgroups. Lau and Murnighan (1998) note that fault lines can be particularly divisive when subgroup boundaries converge (Brewer & Campbell, 1976). For example, if a distant study group member is also the only female in the group, fault lines may lead subgroups to “marginalize” other group members—for example, to ignore them—and marginalization thereby contributes directly to decreases in the synergistic value of having a study group in the first place.

When fault lines “marginalize” group members, those group members are likely to have less access to important resources (Brass, 1992)—such as the information and support of other group members—which may compromise their effectiveness as members of the group. Armstrong and Cole (2002) and Cramton (2001) describe how polarized subgroups in the distributed teams they studied withheld information from each other. Similarly, Kramer and Brewer (1984) and Earley and Mosakowski (2000) report that subgroup differentiation interferes with cooperative group behavior. Finally, Cramton (2002) noted that attributions made about non-co-located team members may be harshly inaccurate in ways that polarize a group by strengthening identifications only with co-located others.

From a social network perspective, face-to-face contact is likely to influence the strength of social network ties (Byrne, 1961), such that differential virtuality within a study group will mean that more social capital is created among some study group members than among others. In turn, the strength of network ties can also influence the quality of information shared among study group members. For example, Cross and Sproull (2004) found that individuals with weak ties were more likely to simply share solutions to problems, while individuals with stronger ties were more likely to engage in deeper forms of problem reformulation.

In the end, these concerns all suggest that disrupted information sharing and degraded social networking effectiveness may not be the most important—and certainly not the only—challenge faced by virtual study groups. Virtual study groups must also be concerned with the effects of marginalizing study group members when disrupted information sharing and degraded networking effectiveness operate differentially among members within a study group.

An Empirical Investigation of Study Group Dispersion Patterns

Given the problems that meeting virtually poses for study groups, Hewitt and Scardamalia (1998, p. 81) note that, "The challenge is to identify the kinds of distributions [of students and student cognitions] that are educationally effective, and then to search for ways that they can play a more central role in day-to-day classroom activities." To borrow from Rock and Pratt (2002), if differences in virtuality within study groups cause problems because they create fault lines, it is critical to understand the effects of different student dispersion patterns when study groups meet.

What follows is the summary of an empirical investigation of different representative types of study group dispersion patterns. Twenty-eight female and 40 male undergraduates at a major university participated in exchange for course extra-credit. Single-sex groups of four were randomly assigned to one of the four dispersion configurations. Communication was face-to-face or via speakerphone, as required by the configuration. We chose this design to provide a solid foundation for the study of information transfer in virtual groups. Conference calls and face-to-face interaction provide the most basic communication choices that groups might employ. (Below, we will put conference calls in context with more complex communication dynamics and options.)

Each participant's materials included: (a) information about three faculty candidates to be considered for a job in the Business School's Business Communication Department and (b) two paper-and-pencil questionnaires (which provided the dependent measures for the study). The faculty candidate information was provided in the form of a hidden-profile task (Stasser & Stewart, 1992) roughly based on the scenario presented in Cruz, Henningsen, and Williams (1996). Each participant played the role of a professor on a recruiting committee and received three unique letters of recommendation—one for each candidate. Each letter of recommendation provided one piece of unique information (received only by that participant) regarding the candidate, as well as six pieces of common information (received by all participants). Two remaining pieces of common information were provided in the form of Equal Employment Opportunity Commission (EEOC) reporting documents for each candidate.

Each participant's unique information focused on one dimension across all three candidates. For example, the letters of recommendation provided to

Professor White included information about the three candidates' teaching excellence (the unique information provided to Professor White), as well as information about the eight common dimensions. The instructions noted that each of the 12 (eight common and four unique) dimensions were equally important to the hiring decision. Table 1 shows how the information was distributed and scored. The hidden profile nature of this information distribution requires that all participants effectively share their unique information with the group in order for the group's deliberations to reach an appropriate conclusion.

The key design features of the dispersion patterns in the study were *nodes* and *solos*. A node occurs where multiple members of a study group are co-located (i.e., meeting face-to-face). A solo occurs where one member of the study group is not co-located with any other member of the study group (i.e., is alone). Thus, a completely face-to-face group consists of one node, while a completely virtual group consists of four solos. The other possibilities are multiple nodes, or a mixture of nodes and solos. (Figure 1 depicts one node and one solo.)

Our empirical investigation focused on four different group dispersion configurations: (1) four members completely face-to-face (4Node), (2) four solo members, none co-located—completely virtual (4Solo), (3) two nodes of two members each (2-2Node), and (3) one node of three members with one solo (3Node/1Solo). These different dispersion patterns were chosen to represent the most prototypical ways that study groups might meet.

Table 1. Information distribution and qualification content

		FACULTY CANDIDATE		
QUALIFICATION DIMENSION	Who Held Information	John	Sally	Edna
Excellent teacher	Prof. White	1	0	0
Able to teach a diverse set of courses	Everyone	0	1	.5
Record of producing a large quantity research	Everyone	0	1	1
Quality Research	Prof. Green	1	0	0
Willing to engage in internal service activities	Prof. Red	1	0	0
Willing to engage in external service activities	Everyone	0	1	1
Strong educational preparation	Prof. Blue	1	0	0
Considerable college teaching experience	Everyone	1	.5	1
Woman	Everyone	0	1	1
Minority	Everyone	1	1	0
Unable to offer a large salary	Everyone	1	0	1
Likely to stay with the department for a substantial period of time	Everyone	0	1	1
Total Score for Candidate:		7	6.5	6.5

John equal to 1 indicates that information shows John to be qualified on that dimension. Zero means not qualified and 0.5 is partially qualified.

As noted above, communication for these groups was via conference call in the non-co-located settings. We have found that conference calls are a modal way for virtual teams to work when synchronous communication is possible. These calls are often augmented with use of instant messaging (allowing for subgroups to carry on parallel conversations), e-mail or other methods of sharing documents, and (in rare cases) video. This study thus provides a base-line for consideration of more sophisticated virtual communication scenarios.

Figure 2 provides a conceptual model of the effects of different study group dispersion configurations. The effects of nodes and solos in study group dispersion configurations hinge on two issues: Member Salience and Information Acquisition Urgency. These two dynamics are expected to be key to understanding study group performance given any current or future technical environment. The measured effects in the study were information integration (which reflects the study group goal of intellectual cross-pollination) and social integration (which reflects the study group goal of social networking).

Member Salience

Starbuck and Milliken (1988, p. 60) noted that, "noticing may be at least as important as sensemaking.... If events are noticed, people make sense of them; and if events are not noticed, they are not available for sensemaking." This has direct bearing on the understanding of team dispersion configurations and information flow dynamics. All other things being equal, fellow study group members who are co-located are more likely to be noticed than fellow study group members who are not.

Physical contact has been shown to be a primary determinant of liking (Zajonc, 1968) and friendship development (Festinger et al., 1950), and effective research and development interactions (Allen, 1977). In the context of teams with nodes and solos, this means that all study group members are not created equal. The physical presence of others influences an individual's perception of salient social categories (Ashforth & Mael, 1989; Hogg & Turner, 1984; Turner, 1985). The specific operationalization of these effects is that non-co-located members may fall, "'off people's radar screens' and [be] ignored even during telephone and videoconferences" (Armstrong & Cole, 2002, pp. 170-171). This leads to a first testable proposition:

Proposition 1: Co-located group members are more salient to one another than are non-co-located group members.

Proposition 1 was supported. Our measure of salience was whom participants mentioned first when asked to list the other group members. Co-located study group members were 29% more salient than non-co-located members ($t = 3.6$, $p < .001$).

The next question is whether salience matters to study group effectiveness. For this, we focused on the role salience plays in the likelihood that a participant’s unique information is integrated into the other group members’ understanding of the problem.

Proposition 2: Higher member salience will result in greater integration of available unique information.

Proposition 2 was also supported. Other members’ salience was a significant predictor of a participant’s ability to recall the unique information held by all group members ($F_{(1,66)} = 3.99, p < .05$). Scores could range from 0 to 12 given that there were three pieces of unique information for each participant. The mean was 5.68 correct (*SD* = 1.44). See Figure 3 for the overall results by condition.

Information Acquisition Urgency

As depicted in Figure 2, study group dispersion configuration may also create a sense of urgency regarding the acquisition of other group members’ attention and unique information—keeping fellow study group members engaged in the discussion. Teams have been shown to adaptively structure their interactions (DeSanctis, Poole, & Dickson, 2000)—they may pick different processes or technologies given their situation. Teams with dispersion configurations that reduce member salience may also increase urgency to acquire information.

Urgency is likely a function of the study group’s dispersion configuration—for example, a function of the presence of solos in the group. Individuals in completely face-to-face settings probably will feel the least urgency to keep fellow group members in the discussion, since they are all co-located. How-

Figure 2. Conceptual model

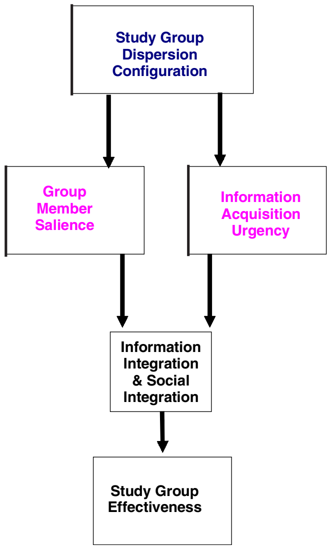
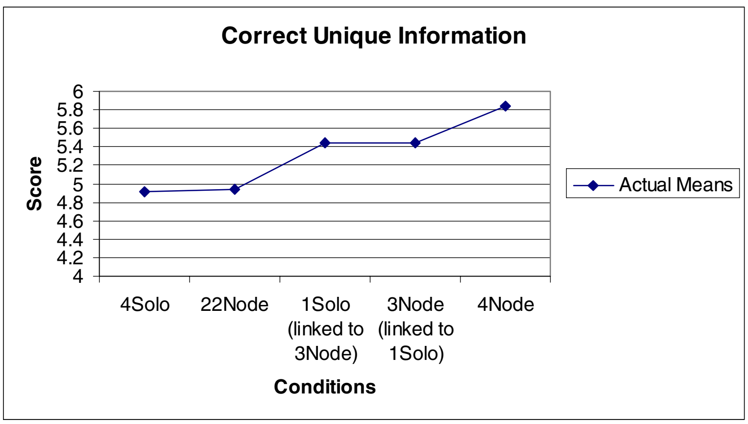


Figure 3.



ever, dispersion configurations that create multiple subgroups (in this setting, the 2-2Nodes) may prove equally complacent. All group members are co-located with someone (no solos). Each study group member has another study group member to work with, and no one has to be concerned that anyone is cut off from the study group.

In contrast, when all study group members are solos (4Solo), there may be lots of urgency. When everyone is known to be on their own (not co-located with anyone else), there is a level playing field, and everyone probably feels some responsibility for getting everyone involved and any unique information shared. Ironically, groups with a combination of nodes and solos (3Node/1Solo) may also experience a strong sense of urgency. In this configuration, the solos are known to be in a compromised situation. The solos know that they need to break into the face-to-face node, and the face-to-face node realizes that there are solos who are conspicuous in their absence. This leads to a third testable proposition:

Proposition 3: An individual’s urgency to gather information from others is a function of the number of group members not co-located with that individual, and the number of solos in the study group.

Urgency was measured by a two-item scale (“How important was it for you to hear the comments from the other group members?” and “How essential did you think it was for you to have access to the other group member’s information?”—measured on a five-point rating scale, 1=Not at all, 5 = Extremely Hard). Proposition 3 was supported ($F_{(3, 63)} = 3.34$, $p < .02$).

The urgency displayed by a group member may also have an affect on the ability of the other group members to integrate that person’s information. The dynamic of striving to collect information may push a reciprocal effort from the other group members. This leads to a final proposition:

Proposition 4: An individual’s urgency to gather information from others influences the likelihood that his/her unique information is known to other study group members.

We tested this last proposition by using each participant’s own urgency score as the predictor for whether or not that participant’s unique information was known by their fellow group members. This final proposition also was supported ($F_{(1,202)} = 5.26$, $p < .02$).

General Discussion and Conclusions

The goal of this chapter has been to provide a theoretical perspective on the use of virtual study groups, and to detail an initial empirical investigation into the effects of different virtual study group dispersion configurations. What seems clear from our discussion is that virtual study groups provide a high-potential design element in working adult education programs, but one whose value could easily be compromised by the mismanagement of study group interaction patterns.

One of the first things educational program designers need to appreciate is that different study group interaction patterns and environments will have implications for what students are likely to take away from the program itself. Study groups are an effective method for enhancing collaborative student learning by increasing idea exchange and drawing on other team members' discipline-specific strengths. These interactions can also foster the development of skills related to managing group dynamics, as well as leading teams. Finally, study groups give students the benefit of developing social networks—relationships that will likely continue adding value well after the formal educational experience has ended.

Virtual study groups can also serve to help students meet these same goals, and virtual interaction is particularly attractive for very busy working adults, who themselves have an ever increasing familiarity with technology that can facilitate study group interactions. While in the past geographic considerations may have necessarily played a large role in study group composition, Internet-based collaboration tools now allow for the formation of virtual study groups whose members represent a broad diversity of geographic locations and business backgrounds.

While such virtual study groups have benefits, the use of such groups creates some special considerations that educational program designers need to consider. As noted in this chapter, information sharing in virtual study groups may be disrupted relative to face-to-face arrangements. Such disrupted information exchange runs counter to the goal of collaborative learning through effective idea exchange—an advantage typically associated with group work. In addition, virtual teamwork may degrade attachment among members, which again runs counter to the social network development benefits that many students seek. Finally, such study groups may also function less efficiently because members may have more difficulty assessing the skills and knowledge of other group members.

So what conclusions should we draw regarding the dispersion configurations of study groups in educational settings? Specifically, how should working-adult educational programs design study groups in support of the classroom experience? Our empirical investigation points to the importance of understanding that differential virtuality within a study group may create fault lines and subgroups that can disrupt information flow and degrade the social networking potential of study groups. We believe these results are telling regardless of the particular technology used. All groups make decisions regarding the types of technologies they will use to interact, the aspects of the technologies that will be appropriated, and the interplay between group dynamics and technology use (e.g., DeSanctis et al., 2000).

Study group training done early in any "working adult" curriculum should plant the seed that there are serious consequences to the interaction routines a study group establishes. Just as study groups make decisions about whether or not to use video versus conference calling, they also need to make decisions about how they will structure study group interaction, and given a structure, how the team will be managed. What follows are four results that can form the basis of such training and better inform study group decision-making.

First, students need to know that co-located group members are more salient to one another than are non-co-located group members. This most basic of our findings can be captured in the maxim, "out of sight, out of mind"—rather than "absence makes the heart grow fonder." To manage this problem we offer two suggestions—work in a face-to-face configuration when feasible, but also develop group processes that raise the salience of each group member when face-to-face interaction is not possible. For example, explicitly put each member on the agenda. Use a conferencing system that shows each person's location, time zone, and so forth. Some groups use systems displaying pictures or avatars to personalize the communication. More facilitation-focused tools could be used to keep the "pulse" of the team— perhaps by an anonymous display of engagement, or the level of participation by group members in discussion threads and the like.

Second, groups need to understand that the payoff of higher group member salience is greater integration of available information. In our research, group members were better able to integrate the information of more salient others. Encourage study groups to carefully weigh the costs/benefits of working apart. Groups need to make educated decisions about their task and interaction routine choices and then adapt their process as needed (as noted above).

Third, an individual's urgency to gather information from other group members is a function of the number of group members not co-located with that individual and the number of solo group members. This seems to result in an interesting effect whereby working face-to-face with those you can (creating multiple co-located subgroups) may be a bad idea. This common practice (for example those on the north side of town meeting face-to-face to conference call with those on the south side of town, or those at the Singapore office meeting face-to-face to conference call with those in the German office) resulted in low integration in our study. Our results suggest that dispersion configurations composed only of nodes result in a form of information-sharing complacency. The results from dispersion configurations with at least one solo (for example, the 3Node/1Solo configuration in our study) keep urgency high enough to overcome what could be complacency on the part of the node members.

Finally, a study group member's own urgency influences the likelihood that her/his information is integrated into the study group's outcome. One person can make a difference. Group members who understand that they need to work to gain access to information—whether they are solos or members of nodes—positively influence the likelihood that their information is heard. Systems that allow individuals to "break" into on-going conversations to signal their urgency add value to more virtual groups. Some computer conferencing systems allow users to virtually "raise your hand." Some teleconferencing groups manage this more socially; group members understand that a tapping noise on the microphone is akin to raising your hand. The key is for the group to understand that urgency to contribute is important, and that methods for signaling urgency need to be developed for whatever communication tools are in use.

These recommendations all point to the importance of study group training and orientation in order for virtual study groups to succeed. Almost all graduate management degree programs emphasize the importance of groups, and some even provide separate team building or training (in support of study groups and group project work) beyond that covered in the organization behavior content areas. There seems to remain, however, a gap between what programs desire with respect to groupwork, and how those same programs train people in groupwork—particularly *virtual* groupwork. Most orientation programs are face-to-face, even when the overall program is considered to be virtual or "global." For example, one distributed MBA program we are familiar with opens with a brief reading period where the students prepare for the first face-to-face session. During the face-to-face session there are a variety of orientation programs, including discussions of groupwork. Though some of the discussion focuses on effective practices for working in distributed study groups, none of the experiential training is conducted in a virtual environment.

This seems a critical mismatch. Moreland (2000) found that team training needs to be on task and with team members to be effective. This suggests that effective study group training—and effective group content education—needs to include a virtual component. Study groups should not be trained to work in face-to-face settings when they will be working in virtual environments. We should be helping them understand the implications of their choices regarding how they do their study group work. While researchers have found virtual interaction to be disruptive, they have also found that experience can help overcome the limitations of meeting virtually (e.g., Burke, Aytes, & Chidambaram, 2001; Chidambaram, 1996). As Hoag, Jayakar, and Erickson (2003, p. 379) noted, under the right circumstances, "…there may be no significant difference in the way individuals perceive online or face-to-face team interaction." Those "right circumstances" almost certainly include getting study groups far down the virtual groupwork learning curve as quickly as possible, so that by the time they need to be on task together they have expanded both their understanding of and capacity to interact richly, even when interacting virtually (Carlson & Zmud, 1999).

If virtual study groups have the drawbacks we have discussed, should programs catering to busy working-adults encourage their use? We believe the answer is yes. The potential benefits of such study groups are great. Increased study group diversity allowed by the possibility of virtual interaction should increase learning, social networks, and group dynamics and leadership skills, but only if study groups are assisted in overcoming the problems we have identified here.

References

Alge, B. J., Wiethoff, C., & Klein, H. J. (2003). When does the medium matter? Knowledge-building experiences and opportunities in decision-making teams. *Organizational Behavior and Human Decision Processes*, *91*, 26-37.

Allen, T. J. (1977). *Managing the flow of technology, technology transfer and the dissemination of technological information with the R&D organization*. Cambridge: MIT Press.

Armstrong, D. J., & Cole, P. (2002). Managing distances and differences in geographically distributed work groups. In P. J. Hinds & S. Kiesler (Eds.), *Distributed work* (pp. 167-186). Cambridge: MIT

Ashforth, B. E., & Mael, F. (1989). Social identity theory and the organization. *Academy of Management Review*, *14,* 20-39.

Baldwin, T. T., Bedell, M. D., & Johnson, J. L. (1997). The social fabric of a team-based MBA program: Network effects on student satisfaction and performance. *Academy of Management Journal*, *40,* 1369-1397

Brass, D. J. (1992). Power in organizations: A social network perspective. In G. Moore and J. A. Whitt (Eds.), *Research in politics and society* (pp. 295-323). Greenwich, CT: JAI.

Brewer, M. B., & Campbell, D. T. (1976). *Ethnocentrism and intergroup attitudes: East African evidence*. New York: Halstead Press (Sage).

Broad, W. J. (1981). The publishing game: Getting more for less. *Science, 211,* 1137-1138.

Burke, K., Aytes, K., & Chidambaram, L. (2001). Media effects on the development of cohesion and process satisfaction in computer-supported workgroups: An analysis from two longitudinal studies. *Information Technology and People, 14,* 122-141.

Burke, K., & Chidambaram, L. (1999). How much bandwidth is enough? A longitudinal examination of media characteristics and group outcomes. *MIS Quarterly, 23,* 557-579.

Byrne, D. (1961). The influence of propinquity and opportunities for interaction on classroom relationships, *Human Relations*, *14*, 63-69.

Byrne, J. A. (1995) Business Week guide to the best business schools. *Business Week.* New York: McGraw-Hill.

Carlson, J. R., & Zmud, R. W. (1999) Channel expansion theory and the experiential nature of media richness perceptions. *Academy of Management Journal*, *42,* 153-170.

Chapman, A. J., Sheehy, N. P., Heywood, S., Dooley, B., & Collins, S. C. (1995). The organizational implications of teleworking. In I. T. Robertson (Ed.), *International review of industrial and organizational psychology*, (Vol. 10, pp. 229-248). Chichester, UK: John Wiley.

Chen, G., Donahue, L. M., & Klimoski, R. J. (2004). Training undergraduates to work in organizational teams. *Academy of Management Learning and Education, 3*, 27-40.

Chidambaram, L. (1996). Relational development in computer-supported groups. *MIS Quarterly*, *20,* 143-165.

Cohen S. G., & Bailey D.E. (1997). What makes teams work: Group effectiveness research from the shop floor to the executive suite. *Journal of Management*, *23,* 239-290.

Cramton, C. D. (2001). The mutual knowledge problem and its consequences for dispersed collaboration. *Organization Science*, *12,* 346-371.

Cramton, C. D. (2002). Attribution in distributed work groups. In P. Hinds & S. Kiesler (Eds.), *Distributed work* (pp. 191-212). Cambridge: MIT Press.

Cross, R., & Sproull, L. (2004). More than an answer: Information relationships for actionable knowledge, *Organization Science*, *15,* 446-462.

Cruz, M. G., Henningsen, D. D., & Williams, M. L. M. (1996). *Normative influence in the absence of groups? Consequences for decisions, task difficulty, task attractiveness, decision quality, and conformity*. Retrieved December 28, 2002, from http://www.public.asu.edu/~corman/infosys/papers/cruz.pdf

DeSanctis, G., Poole, M. S., & Dickson, G. W. (2000). Teams and technology: Interactions over time. In M. A. Neale, E. A. Mannix, & T. L. Griffith (Eds.), *Research on managing groups and teams: Technology* (Vol. 3). Stamford, CT: JAI.

Deutsch, M. (1962). Cooperation and trust: Some theoretical notes. In M. R. Jones (Ed.), *Nebraska Symposium on motivation* (pp. 275-319). Lincoln, NE: University of Nebraska.

Devine, D. J., Clayton, L. D., Philips, J. L., Dunford, B. B., & Melner, S. B. (1999). Teams in organizations: Prevalence, characteristics, and effectiveness, *Small Group Research, 30*, 678-711.

Earley, P. C., & Mosakowski, E. (2000). Creating hybrid team cultures: An empirical test of transnational team functioning. *Academy of Management Journal*, *43,* 26-49.

Festinger, L., Schachter, S., & Back, K. (1950). *Social pressures in informal groups: A study of human factors in housing*. Palo Alto, CA: Stanford University.

Graetz, K. A., Boyle, E. S., Kimble, C. E., Thompson, P., & Garloch, J. L. (1998). Information sharing in face-to-face, teleconferencing, and electronic chat groups. *Small Group Research, 29*, 714-743.

Griffith, T. L., Mannix, E. A., & Neale, M. A. (2003). Conflict in virtual teams. In C. B. Gibson & S. G. Cohen (Eds.), *Virtual teams that work* (pp. 335-352). San Francisco: Jossey-Bass.

Griffith, T. L., & Neale, M. A. (2001). Information Processing in Traditional, Hybrid, and Virtual Teams: From Nascent Knowledge to Transactive Memory. In B. M. Staw & R. I. Sutton (Eds.), *Research in organizational behavior* (Vol. 23, pp. 379-421). Stamford, CT: JAI.

Griffith, T. L., Sawyer, J. E., & Neale, M. A. (2003). Virtualness and knowledge in teams: Managing the love triangle of organizations, individuals, and information technology. *MIS Quarterly*, *27*, 265-287.

Hambrick, D. C. (1994). Top management groups: A conceptual integration and reconsideration of the "team" label. In B. M. Staw & L. L. Cummings (Eds.), *Research in organizational behavior* (pp. 171-214). Greenwich, CT: JAI.

Hewitt, J., & Scardamalia, M. (1998). Design principles for distributed knowledge building processes. *Educational Psychology Review, 10,* 75-96.

Hinds, P., & Bailey, D. (2003). Out of sight, out of sync: Understanding conflict in distributed teams. *Organization Science*, *14*, 615-632.

Hoag, A. M., Jayakar, K. P., & Erickson, K. (2003, Winter). The role of trust in virtual and interpersonal environments: Implications for team learning and case method pedagogies. *Journalism and Mass Communication Educator*, 370-383.

Hogg, M. A., & Turner, J. C. (1984). Social identify and conformity: A theory of referent information influence. In W. Doise & S. Moscovici (Eds.), *Current Issues in European Social Psychology* (Vol. 2, pp.139-182). Cambridge, UK: Cambridge University.

Hollingshead, A. B. (1996). Information suppression and status persistence in group decision making: The effects of communication media. *Human Communication Research*, *23,* 193-219.

Huws, U. (1993). *Teleworking in Britain* (Report #18), London: The Employment Department Research Series.

Jarvenpaa, S. L., Knoll, K., & Leidner, D. E. (1998). Is anybody out there? Antecedents of trust in global virtual teams. *Journal of Management Information Systems*, *14,* 29-64.

Johnson, D. W., & Johnson, R. T. (1989). *Cooperation and competition: Theory and research*. Edina, MN: Interaction Book.

Johnson, D. W., & Johnson, R. T. (1994). *Leading the cooperative school* (2nd ed.). Edina, MN: Interaction Book.

Johnson, S. D., Suriya, C., Yoon, S. W., Berrett, J. V., & LaFleur, J. (2002). Team development and group processes of virtual learning teams. *Computers and Education*, *29*, 379-393.

Kinsman, F. (1987). *The telecommuters*. Chichester, UK: John Wiley.

Kramer, R., & Brewer, M. (1984). Effects of group identity on resource use in a simulated commons dilemma. *Journal of Personality and Social Psychology, 46*, 1944-1057.

Lau, D. C., & Murnighan, J. K. (1998). Demographic diversity and fault lines: The compositional dynamics of organizational groups. *Academy of Management Review, 23,* 325-340.

Lawler, E. E. (1999). Employee involvement makes a difference. *The Journal for Quality and Participation*, *22*, 18-20.

Lee, Y., & Ottati, V. (1993). Determinants of in-group and out-group perceptions of heterogeneity: An investigation of Sino-American stereotypes. *Journal of Cross-Cultural Psychology*, *24,* 298-318.

Lipnack, J., & Stamps, J. (1997). *Virtual teams* (2nd ed.). New York: John Wiley.

Lengnick-Hall, C. A., & Sanders, M. M. (1997). Designing effective learning systems for management education: Student roles, requisite variety, and practicing what we teach. *Academy of Management Journal*, *40,* 1334-1368.

Majchrzak, A., Rice, R. E., King, N., & Ba, S. (2000). Technology adaptation: The case of a computer-supported inter-organizational virtual team. *MIS Quarterly, 24,* 569-600.

McGrath, J. E., & Hollingshead, A. E. (1994). *Group interacting with technologies: Ideas, evidence, issues, and agenda*. Thousand Oaks, CA: Sage.

Michaelson, L. K., Jones, C. F., & Watson, W. E. (1993). Beyond groups and cooperation: Building high performance learning teams. In D. L. Wright & J. P. Lunde (Eds.), *To improve the academy: Resources for faculty, instructional, and organizational development* (pp. 127-145). Stillwater, OK: New Forums.

Moreland, R. L. (2000). *Transactive Memory: Learning who knows what in work groups and organizations*. In L. Thompson, D. Messick, & J. Levine (Eds.), *Shared cognition in organizations: the management of knowledge* (pp. 3-31). Hillsdale, NJ: Lawrence Erlbaum.

Mugny, G., Sanchez-Mazas, M., Roux, P.,& Perez, J.A. (1991) Independence and interdependence of group judgments: Xenophobia and minority influence. *European Journal of Social Psychology, 21*, 213-223.

O'Neil, H. F., Allerd, K., & Baker, E. L. (1997). Review of workforce readiness theoretical frameworks. In H. F. O'Neil (Ed.) *Workforce readiness*: *Competencies and assessment* (pp. 3-25). Mahwah, NJ: Lawrence Erlbaum.

Ramsower, R. M. (1985). *Telecommuting: The organizational and behavioral effects of working at home*. Ann Arbor, MI: UMI Research.

Richter, J., & Meshulam, I. (1993). Telework at home: The home and the organization perspective. *Human Systems Management, 12,* 193-204.

Rock, K. W., & Pratt, M. G. (2002). Where do we go from here? On the relationship between identification and employee dispersion patterns. In G. Soenen & B. Moingeon (Eds.), *Organizational identities: An integrative perspective* (pp. 51-71). London: Routledge.

Rockmann, K. W., & Northcraft, G. B. (2005). The ethical implications of virtual interaction. In A. Tenbrunsel, E. Mannix, & M. Neale (Eds.), *Research on managing groups and teams, 7* (in press).

Rockmann, K., Pratt, M. G., & Northcraft, G. B. (2004). O*vercoming multiple subgroups in distributed teams: The impact of subgroup alignment and communication media on team identification and expertise recognition.* Working paper. University of Illinois.

Schmuck, R. A., & Schmuck, P. A. (1997). *Group processes in the classroom* (7th ed.). Chicago: Brown & Benchmark.

Schneider, S. K., & Northcraft, G. B. (1999). Three social dilemmas in managing the diverse organization: A social identity perspective. *Human Relations, 52*, 1445-1467.

Smith, K. G., Smith, K. A., Olian, J. D., Sims, H. P., O'Bannon, D. P., & Scully, J. A. (1994). Top management team demography and process: The role of social integration and communication. *Administrative Science Quarterly, 39*, 412-438.

Solomon, N. A., & Templer, A. J. (1993). Development of non-traditional work sites: The challenge of telecommuting. *The Journal of Management Development, 12,* 21-33.

Stasser, G., & Stewart, D. (1992). Discovery of hidden profiles by decision-making groups: Solving a problem versus making a judgment. *Journal of Personality and Social Psychology*, *63*, 426-434.

Starbuck, W. H., & Milliken, F. J. (1988). Executives' perceptual filters: What they notice and how they make sense. In D.C. Hambrick (Ed.), *The executive effect: Concepts and methods for studying top managers*. Greenwich, CT: JAI.

Stevens, M. A., & Campion, M. J. (1994). The knowledge, skills, and ability requirements for teamwork: Implications for human resource management. *Journal of Management*, *20*, 503-530.

Stunkel, K. R. (1998). Point of view. *Chronicle of Higher Education*, *44,* A52.

Turner, J. C. (1985). Social categorization and the self-concept: A social cognitive theory of group behavior. In E. Lawler (Ed.), *Advances in Group Processes* (Vol. 2, pp. 77-122). Greenwich, CT: JAI.

Warkentin, M. F., Sayeed, L., & Hightower, R. (1997). Virtual teams versus face-to-face teams: An exploratory study of a Web-based conference system. *Decision Science*, *28*, 975-996.

Wegner, D. M. (1987). Transactive memory: A contemporary analysis of the group mind. In B. Mullen & G. R. Goethals (Eds.), *Theories of group behavior* (pp. 185-208). New York: Springer-Verlag.

Zajonc, R. B. (1968). Attitudinal effects of mere exposure. *Journal of Personality and Social Psychology*, *9*, 1-27.