Soliciting user-input during the development of an accounting information system: investigating the efficacy of group discussion

James E. Hunton a,*, Dana Gibson b

a School of Accountancy, College of Business Administration, University of South Florida, 4202 East Fowler Avenue, BSN 3403, Tampa, FL 33620-5500, USA

b Department of Accounting, College of Business Administration, Texas Woman’s University, Denton, TX, USA

Abstract

This study reports the results of a longitudinal field experiment designed to examine the impact of group discussion when soliciting user requirements of an accounting information system. A total of 346 subjects were randomly assigned to individual and group treatment conditions. Pre- and post-experiment surveys, administered 12 months apart, assessed cognitive, motivational, and desired outcome factors. Objective measures of cognition were obtained during a five-week user-input period and actual performance data were collected over 18 months. Results indicate significantly greater pre-experiment to post-experiment gains in psychological and behavioral variables in the group, as compared to the individual, condition. Structural equation modeling highlights the key mediating roles of cognition and motivation on desired user outcomes in a group setting. © 1999 Elsevier Science Ltd. All rights reserved.

1. Introduction

Accounting information system design decisions are not made in isolation; rather, system developers must consider a host of relevant human factors, such as the concerns, opinions, and suggestions of a diverse constituency of system users. One way to include various affected users in the design process is to provide them with opportunities to express, compare, and contrast their design preferences in group settings during the requirements definition phase of a systems development project (Lind, 1995; Lind & Tyler, 1988; Vessey & Conger, 1993). Many researchers indicate that discussion of this nature is a critical group participation activity leading to high quality decisions, primarily due to the collective sharing of intellectual resources (e.g. Maier, 1963; McGrath, 1991; Osborn, 1957; Stasser & Titus, 1985; Vroom & Jago, 1988).

The use of group participation is expanding into all facets of the accounting profession, such as tax planning, auditing, consulting, systems designing, and budgeting (Brecht & Martin, 1996; Sutton & Hayne, 1997). While the trend toward collective participation is rising across the professional
community, accounting research in the area of participation continues to focus on individuals. Sutton and Hayne urge accounting researchers to investigate various forms of group participation in a wide variety of accounting-related situations. Specifying design requirements of accounting information systems is an area where accountants can add considerable value to group processes because of their unique, multifaceted role as users, evaluators, developers, and assurers. Accordingly, the current study focuses on the effectiveness of facilitating small group discussion in an important accounting scenario—specifying user requirements of an accounting information system.

This study is unique along three important dimensions. First, the relative efficacy of group versus individual participation strategies is compared. From a theoretical perspective, the current study enhances our understanding of group processes by examining simultaneous relationships among cognitive, motivational, and outcome constructs using a structural equations model (SEM). We find that the strength of the relationships among these constructs is significantly greater in the group, as compared to the individual, condition. The SEM also indicates that cognition and motivation are key mediators between user-input and desired outcomes. To our knowledge, this is the only longitudinal field experiment in accounting and reference disciplines (e.g. psychology and organizational behavior) with a sufficient sample size to compare individual and group processes using a SEM. Second, this experiment examines real actors performing real tasks in a contextually rich, natural environment. When conducting longitudinal field experimentation of this nature, it is difficult to precisely control all internal threats to validity. However, field experiments are rare in accounting and reference disciplines, and if internal threats are controlled with a reasonable degree of assurance, research results can contribute valuable knowledge and understanding to the external and ecological validity of extant theory (Libby & Luft, 1993). Finally, most user participation research relies on self-reports of cognitive perceptions and behavioral intentions because it is difficult to obtain objective data of this nature, particularly outside of laboratory settings. In the current study, we obtained and analyzed objective measures of cognition and user performance. Pairing objective data with self-reported attitudes and perceptions provides a solid foundation for assessing convergent validity of latent construct indicators within a research framework.

2. Theory and hypotheses

Extant participation literature in accounting investigates, for the most part, the impact of individual subordinate involvement in influencing and determining budgets (Shields & Shields, 1998). The current study expands the scope of accounting participation research by examining the influence of user participation, both individual and group, in determining the specifications of an accounting information system. Many information systems (IS) researchers believe that user participation, particularly during the requirements definition phase of a systems development project, is critical to overall system success (Cushing, 1990; Doll & Torkzadeh, 1991; Vessey & Conger, 1993). A variety of IS studies have examined the impact of user participation on desired attitudes and behavior; however, study findings are generally inconclusive (Bailey & Pearson, 1983; Baroudi, Olsen & Ives, 1986; Cavaye, 1995; DeLone & McLean, 1992; Ives & Olson, 1984). Despite past equivocal results, researchers continue to believe that the nature, timing, and extent of user participation are key factors leading to IS success (Hunton & Price, 1994).

Barki and Hartwick (1994) have examined, validated and categorized the participation construct for IS users. The following three types of user participation have been identified: overall responsibility, user-IS relationship, and hands-on activity. The former category refers to user activities and assignments aimed at providing overall accountability for the systems development project, such as leading a project group or selecting hardware and software. User-IS relationship reflects user activities that are focused on influencing the IS staff, for example approving IS staff work plans or evaluating the work performed by the IS staff. Hands-on activity refers to specific
design and implementation tasks performed by system users. For instance, helping to define screen layouts and report formats or creating a user procedure manual are considered to be hands-on activity. In the current study, accounting information system users are asked to provide input to system developers regarding various aspects of the system during the requirements definition phase of a development project. Hence, user participation in this study is interpreted as hands-on activity performed by system users.

Barki and Hartwick (1994) indicate that methodological weaknesses are partially responsible for equivocal results of past participation studies. Leana, Locke and Schweiger (1990) and Dipboye (1990) agree and they provide two important suggestions. First, Leana et al. claim that participation studies using a single questionnaire at a single point in time can artificially distort the magnitude of research findings. They recommend that participative decision-making researchers should engage in longitudinal studies in order to improve measurement reliability. Second, Dipboye notes that laboratory experiments are used in the majority of participation studies. He cautions that methodological artifacts inherent in laboratory settings contribute to mixed findings across studies. In order to avoid this problem, he urges researchers to design and execute studies in field environments, particularly field experiments. In an effort to address these suggested areas of improvement, the current study examines the efficacy of group versus individual user participation by conducting longitudinal research in a field setting.

2.1. Group participation

Judgment and decision-making research in accounting focuses primarily on individuals (Sutton & Hayne, 1997). However, changing business practices have emphasized the critical role of groups in a variety of accounting contexts (Hammer & Champy, 1993; Young & Lewis, 1995). Given the rising prominence and importance of groups in the accounting profession, it is important to investigate the effectiveness of various group participation strategies.

Individual decision-making takes place in three general phases: (1) gathering relevant information, (2) generating and evaluating alternatives, and (3) selecting a course of action (Simon, 1957, 1960). Analogously, the decision-making phases of individuals can be applied to groups (Baron, Kerr & Miller, 1992; Blumberg, 1994). Stasser and Titus (1985) indicate that group discussion during the first phase of decision-making is a critical participative activity leading to high quality decisions. The current study focuses on the efficacy of group discussion during the requirements definition (i.e. information gathering) phase of a systems development project.

When individuals form into a group, each member typically holds a differential set of knowledge relevant to the problem at hand. A given member’s knowledge set is composed of multiple items of information. Typically, information asymmetry exists among group members prior to group discussion. The number of group members who a priori possess a given information item is referred to as the commonality of the item. Information items that are known by all group members are referred to as commonly-held information. Items that are known by more than one but less than all group members are known as partially-held information. Uniquely-held information reflects items known by only one group member.

The ultimate goal of group discussion is for group members to share their partially-held and uniquely-held information with other members (Moreland, Argote & Krishnan, 1996; Stasser & Titus, 1985, 1987). However, Stasser and Titus posit that commonly-held information has a higher probability of being discussed than partially-held information, which has a higher probability of being discussed than uniquely-held information. Two important factors that mitigate this phenomenon, called the common information sampling bias, are familiarity among group members and group member status.

Group members who have gained familiarity through social interaction, training, and work experience expend less cognitive effort attending to social conformity cues and place more emphasis on group performance (Goodman & Leyden,
1991; Kim, 1996; Levine & Moreland, 1990; Liang, Moreland & Argote, 1995). As a result, familiar group members are more likely to exchange partially-held and uniquely-held information because they are less concerned with acceptance and more oriented toward achievement (Katzenbach & Smith, 1993; Kerr, MacCoun & Kramer, 1996). Group members who are peers are also more likely to share partially-held and uniquely-held information (Gruenfeld, Mannix, Williams & Neale, 1996; Hackman & Walton, 1986; Sanna & Shotland, 1990). Peer group members freely exchange information with one another because they are not threatened by unequal power distribution and evaluation apprehension (Arrow & McGrath, 1993; Hackman, 1990, 1992; Hollingshead, 1993; Stasser, Stewart & Whittenbaum, 1995; Whittenbaum & Stasser, 1996).

In the current research, the aforementioned group composition concerns are addressed in the experimental design in an effort to maximize the efficacy of group discussion. Group members in this study have a history of working with one another (familiarity) and they hold equivalent position levels (peers). The research framework is presented in the next section.

2.2. Proposed research model

The research model tested in this study is based on a theoretical framework of accounting information systems user participation developed by Hunton and Price (1994) and supporting research offered by Erez and Arad (1986) and Latham, Winters and Locke (1994). These studies posit that participative decision-making strategies (e.g. individual versus group) affect cognitive and motivational factors, cognition positively impacts motivation, and both cognitive and motivational factors mediate the relationship between participation and desired user outcomes. These relationships, discussed next, are depicted in Fig. 1.1

2.2.1. Cognitive factors

In a group discussion environment, one indicator of cognition is the number of discrete ideas generated by participants (e.g. more ideas suggest greater cognition) (Haire, Blumberg, Davies & Kent, 1994). In this study, all subjects record their ideas regarding ways to improve the existing accounting information system. In the individual condition, subjects record their ideas in isolation. In the group condition, subjects first collectively discuss relevant issues and then members separately record their ideas using the same format as the individual participants. Because group members are likely to share partially-held and uniquely-held information with one another, we present the following hypothesis (alternate form):

H1a: The mean number of discrete ideas provided by group members will be greater than the mean number of discrete ideas offered by individual participants.

Another important cognitive indicator variable is the perceived fairness of the decision process (Hunton & Price, 1994). Process fairness (i.e. procedural justice) refers to the extent to which decision making procedures are believed to be in accordance with accepted and expected norms of behavior (Thibaut & Walker, 1975). Engaging affected parties in a participation strategy can enhance their process fairness beliefs (Lind, Kanfer & Earley, 1990).
One way to meaningfully engage users in the decision process is to provide them with an opportunity to voice their opinions, preferences, and concerns to decision makers. This form of participation can provide participants with a sense of control during the systems development process, particularly if the expression of voice is manifest in the decision outcome (Leventhal, 1980). Based on the control-oriented perspective of procedural justice theory, voice-based participation strategies are expected to enhance perceptions of process fairness, as compared to no participation (Lind & Tyler, 1988). In the current study, all subjects are allowed to participate in information systems development activities by expressing voice to system designers.

The relational perspective of procedural justice theory further asserts that when voice is expressed in a socially interactive environment, as compared to individuals providing voice in isolation, judgments of process fairness are increased because voice takes-on symbolic meaning above and beyond objective control perceptions, such as
enhanced self-esteem, self-confidence, trust in the decision maker, and illusory control (Lind & Tyler, 1988; Lind et al., 1990). As well, expressing voice in a group setting increases social cognition of inclusion in the decision process and attachment to the group (Haire et al., 1994). Finally, the relational perspective posits that voice increases perceptions of fairness because the collective self-interest of the group, rather than personal self-interests, takes precedence (Lind & Tyler). Based on the previous discussion, the following hypothesis is presented (alternate form):

**H1b:** When compared to the individual participation condition, pre-experiment to post-experiment gains in process fairness perceptions will be significantly higher in the group condition.

Based on previously hypothesized gains in the group condition (H1a and H1b) and the assertion of Latham et al. (1994) that cognition is enhanced in group settings, as compared to individual participation contexts, the next hypothesis is presented in alternate form.

**2.2.2. Motivational factors**

Researchers in participative decision-making often frame participation as a means of motivating affected parties to perform target behaviors. While the relationship between motivation and performance has not been clearly demonstrated in prior research, the link between participation and motivation has been tested and supported in a variety of studies (see Wagner & Gooding, 1987 for a review). Two key motivational factors are (a) self-efficacy beliefs (Locke, 1991) and (b) congruence between desired and actual participation (Doll & Torkzadeh, 1989).

Bandura (1986) and Locke (1991) indicate that self-efficacy is an integral component of motivation. Self-efficacy perceptions can be aimed at the participative process (e.g. the extent to which users believe they can effectively contribute to the development of an information system) and the decision outcome (e.g. the extent to which participants believe they can effectively use the information system). In this study, we examine outcome-oriented self-efficacy. In an information systems setting, Compeau and Higgins (1995a,b) report a significant, positive relationship between participation and outcome-oriented self-efficacy. Latham et al. (1994) also report increases in outcome-oriented self-efficacy brought about by voice-based participation.

Bandura (1986) and Locke (1991) indicate that self-efficacy is an integral component of motivation. Self-efficacy perceptions can be aimed at the participative process (e.g. the extent to which users believe they can effectively contribute to the development of an information system) and the decision outcome (e.g. the extent to which participants believe they can effectively use the information system). In this study, we examine outcome-oriented self-efficacy. In an information systems setting, Compeau and Higgins (1995a,b) report a significant, positive relationship between participation and outcome-oriented self-efficacy. Latham et al. (1994) also report increases in outcome-oriented self-efficacy brought about by voice-based participation.

The relational perspective of procedural justice indicates that group participation enhances self-efficacy levels of group members over their individual participants. Providing collective voice to users in a social setting emphasizes symbolic psychological factors embedded within voice, such as inclusion, self-esteem, attachment, self-confidence, and trust (Lind & Tyler, 1988). These relational benefits coupled with the collective sense of duty, responsibility, and empowerment arising from group participation (Jackson, 1992) are expected to heighten self-efficacy for group members as compared to individuals. Accordingly, the following hypothesis is offered as follows (alternate form):

**H1c:** The positive relationship between participation strategy and the latent construct representing ‘cognitive factors’ will be significantly greater in the group, as compared to the individual, condition.
**H2a:** When compared to the individual participation condition, pre-experiment to post-experiment gains in self-efficacy will be significantly higher in the group condition.

Individuals desire to participate in decisions that affect their well-being, particularly decisions that further their self-interest. The strength of desired participation is positively related to the extent to which affected parties believe the decision outcome is personally relevant and salient (Alluto & Belasco, 1972; Lind & Tyler, 1988). When desired participation exceeds actual (a state of relative deprivation), affected parties become frustrated and the efficacy of participation is diminished. When actual participation exceeds desired (a state of relative saturation), the efficacy of participation is also negatively compromised, although the deleterious impact of saturation is not as pronounced as deprivation. Doll and Torkzadeh (1989) indicate that increased congruence between desired and actual participation motivates information system users to maximize their participative efforts. Additionally, participation congruence is positively related to the formation of consequential user attitudes (e.g. outcome satisfaction and organizational commitment) and user performance (Hunton & Price, 1994). The relational perspective of procedural justice indicates that group participation is considered to be more fulfilling and personally satisfying than individual participation; hence, for affected parties who desire more participation, group discussion is expected to narrow the gap between desired and actual participation to a greater extent than individual participation. Accordingly, the following hypothesis (alternate form) is presented:

**H2b:** When compared to the individual participation condition, pre-experiment to post-experiment gains in participation congruence will be significantly higher in the group condition.

Based on the propositions previously set forth (H2a and H2b) and supporting research findings from Erez and Arad (1986) indicating that motivation is significantly higher in group, as compared to individual, participation strategies, the following hypothesis is indicated (alternate form):

**H2c:** The positive relationship between participation strategy and the latent construct representing ‘motivational factors’ will be significantly greater in the group, as compared to the individual, condition.

**2.2.3. Relationship between cognitive and motivational factors**

Hunton and Price (1994), Erez and Arad (1986) and Latham et al. (1994) suggest a positive relationship between cognition and motivation. They reason that affected parties gain task relevant knowledge and receive salient informational cues (such as increased understanding of alternatives, constraints, and trade-offs) when expressing voice. The appraisal (i.e. thinking) process evoked by voice-based participation can heighten self-efficacy beliefs (Bandura, 1986) and improve the congruence between desired and actual participation (Doll & Torkzadeh, 1989). Theoretical and empirical support for a stronger association between cognition and motivation in group versus individual participation conditions is found in Latham et al. Based on theory and prior evidence, we present the following hypothesis (alternate form):

**H3:** The positive relationship between the latent constructs representing ‘cognitive factors’ and ‘motivational factors’ will be significantly greater in the group, as compared to the individual, condition.

**2.2.4. Relationship between cognitive factors and desired outcomes**

Cognitive factors can be linked to one’s choice of action and the extent to which that action is deemed successful (Locke & Latham, 1990). Cognitions are translated into action when individuals make a volitional choice to consciously appraise their a priori held knowledge and beliefs. The appraisal process integrates an individual’s values, needs, desires, and aspirations into an action plan.
As a result, cognitive factors can be directly linked to attitudinal and behavioral outcome variables. In an experimental setting, Latham et al. (1994) found that cognition (i.e. task strategy quality) was significantly, positively related to performance. Their study also indicated a stronger relationship between cognition and performance in group, as compared to individual, conditions. Accordingly, we anticipate the following (alternate form):

**H4:** The positive relationship between the latent constructs representing ‘cognitive factors’ and ‘desired outcomes’ will be significantly greater in the group, as compared to the individual, condition.

**2.2.5. Relationship between motivational factors and desired outcomes**

Meta-analytic reviews of participation studies have not consistently supported the link between motivation and consequential outcomes. Locke (1991) suggests that equivocal results from prior research are likely due to poor surrogate indicators of motivation. He posits that self-efficacy and participation congruence (based on expectancy theory) are valid motivational factors. Supporting Locke’s assertions, Latham et al. (1994) and Compeau and Higgins (1995a,b) report a significant, positive relationship between outcome-oriented self-efficacy and consequential attitudes and behavior. Doll and Torkzadeh (1989) indicate a significant link between participation congruence, user satisfaction, and intention to use an information system. Erez and Arad (1986) and the relational perspective of procedural justice suggest a greater relationship between motivation and performance in group, as compared to individual, participation conditions. Based on the theory and evidence just presented, the fifth hypothesis is offered as follows (alternate form):

**H5:** The positive relationship between the latent constructs representing ‘motivational factors’ and ‘desired outcomes’ will be significantly greater in the group, as compared to the individual, condition.

**2.2.6. Desired outcomes**

The indicator variables examined in this study representing the latent construct ‘desired outcomes’ are outcome satisfaction, organizational commitment, and user performance. These particular indicator variables were selected primarily because the management of the state agency who sponsored this field experiment desired to measure changes in these factors brought about by the group and individual user participation strategies.

Outcome satisfaction concerns the users’ affective reaction toward the target information system. Doll and Torkzadeh (1988) examined the issue of user satisfaction. The five dimensions of user satisfaction they developed and tested were system accuracy, ease of use, system timeliness, information content, and information format. In this study, we assess the subjects’ pre- and post-experiment levels of user satisfaction along these five dimensions.

Recently, organizational commitment (OC) has been the focus of research in organizational behavior (e.g. Aranya, Pollock & Amernic, 1981; Cohen, 1996; Dunham, Grube & Castaneda, 1994; Jaros, 1995). OC is defined as the strength of an individual’s identification with and involvement in a particular organization. OC is usually characterized by the following factors: “a strong belief in and acceptance of the organization’s goals and values; a willingness to exert considerable effort on behalf of the organization; and a definite desire to maintain organizational membership” (Porter, Steers, Mowday & Boulian, 1974, p. 604). Allen and Meyer (1990) identified three components of commitment: affective, normative and continuance. The affective component of OC refers to the employee’s emotional attachment to, identification with, and involvement in the organization. In this study, we assess the affective component of OC.3

Locke and Latham (1990) and Locke (1991) indicate that prior research in participation demonstrates a weak association between participative activities and human behavior. Locke and Latham and Latham and Lee (1986) suggest that

---

3 Management of the sponsoring State agency and the researchers were concerned about the length of the pre- and post-experiment survey instruments. Hence, management chose to measure only the affective dimension of OC.
research conducted in field settings might help to provide a more clear link between participative decision making and consequential behaviors, especially where the decision outcome and performance measures are closely aligned. In this field experiment, we obtained pre- and post-experiment objective measures of sales order and customer billing data input quality. These performance measures are directly related to the decision outcome (i.e., the revamped accounting information system). Based on the theoretical development of hypotheses H1 through H5, we suggest the final set of hypotheses (alternate form):

H6a: When compared to the individual participation condition, pre-experiment to post-experiment gains in outcome satisfaction will be significantly higher in the group condition.

H6b: When compared to the individual participation condition, pre-experiment to post-experiment gains in organizational commitment will be significantly higher in the group condition.

H6c: When compared to the individual participation condition, pre-experiment to post-experiment gains in sales order data input quality will be significantly higher in the group condition.

H6d: When compared to the individual participation condition, pre-experiment to post-experiment gains in customer billing data input quality will be significantly higher in the group condition.

3. Research method

3.1. Scenario

A large state agency permitted the researchers to conduct a field experiment investigating participation strategies for developing computerized accounting information system applications. The agency is comprised of 46 field offices located throughout the state. Field offices have little or no communication with each other, as they are autonomous in all operational and administrative respects. Field office managers report directly to the agency’s central office located in the capital city. Computerized accounting information systems have evolved at field offices with little guidance from the central office. Accounting applications at field locations, on the whole, were poorly designed and sparsely documented. Customers throughout the state complained about high levels of order entry and billing errors. Users at field offices realized their accounting systems were inadequate, as they had expressed their dissatisfaction to agency managers and state auditors. Based on user feedback and findings of recent annual audits, state auditors mandated the agency to redesign its accounting information systems in an effort to reduce the unacceptably high data input error rates and correct a multitude of additional problems. Accordingly, the agency instituted a five-year plan to revamp all of its computerized accounting and management information systems. The first project was to develop standardized revenue cycle applications (i.e., sales order, cash collection, accounts receivable, and customer billing) at the central information systems department.

The agency director believed that user input throughout the development project was critical to the ultimate success of the system. However, he was unsure whether users should provide individual input to system designers or if it would be more effective for users to discuss their concerns and preferences in small group environments before submitting their suggestions to system designers. Since the director had many more projects planned in the future, he believed that this first initiative presented an opportunity to explore the most effective participation strategy. Consequently, the agency director asked the researchers to design a field experiment to assess which strategy, individual or group, yields higher levels of desired outcomes. In particular, he insisted that the most critical outcome of interest was the quality of data input regarding sales order and customer billing transactions.

---

4 The research scenario and procedure are the same as described in Hunton and Gibson (1998) as the data for that study were collected simultaneously with the current study.

5 The researchers were paid for out-of-pocket expenses only.
3.2. Procedure

At the beginning of the first month of the study (m1), a pre-experiment survey was distributed to all accounting and sales order clerks throughout the agency via the agency’s intranet. The researchers initiated the surveys and ensured participants that individual responses would be held in strict confidence and that only summary measures would be shown to management. A customized program presented survey items randomly to each respondent (to preclude a possible order effect), restricted participants from viewing prior questions (to preclude respondents from looking back to see how they answered a similar survey item and responding in the same way), and prohibited subjects from forwarding results to anyone other than the originating source, i.e. the researchers (to ensure confidentiality).

During the first and second experimental months (m1 and m2), subjects participated in developing the revenue cycle applications. An initial memo was sent from the director to each participant explaining that the agency’s information system design group (ISDG) was developing standardized revenue cycle applications to replace existing field office applications. The director expressed that he and agency management felt it was critically important for application users to be involved in the systems design process. The memo explained that for the next five consecutive Friday mornings, field offices would not open for business at their regular time of 8:00 a.m., instead they would open at 10:00 a.m. Employees would still report for work at 8:00 a.m., however, they would spend these two hours expressing their opinions, concerns, preferences, and suggestions to the ISDG regarding the applications under development. The director made it clear that while employees could not reasonably expect all of their individual preferences and suggestions to be incorporated into the new applications, every effort would be made to include as many of their recommendations as possible in the new systems.

The ISDG and participants communicated via the agency’s intranet system. Each Friday morning, participants received a standardized questionnaire from the ISDG soliciting input regarding certain aspects of the revenue cycle applications under development (i.e. sales order, cash collections, accounts receivable, customer billing). The questionnaires contained open-ended questions pertaining to the topic of the week. The five weekly topics focused on system accuracy, ease of use, system timeliness, information content, and report formats. Two participation conditions (individual and group) were randomized to field offices, resulting in 23 offices assigned to each treatment.

In the individual condition, subjects were asked to remain at their workstations and answer the e-mail questionnaire from the ISDG. Field office supervisors were present to ensure that interaction between subjects did not occur during the answer period. The questionnaire was designed so it could be completed in about 1 hour. After respondents completed the instrument, they were instructed to remain at their desk and work on agency matters until the office opened at 10:00 a.m.

In the group condition, the accounting and sales order clerks met in a conference room, where they received a copy of the weekly questionnaire and discussed relevant issues for 1 h. There were no supervisors present during the meetings in order to facilitate the free exchange of information among clerks; however, supervisors ensured that all clerks attended the meetings. The groups were not facilitated by outside observers. After discussion, group members returned to their respective workstations and answered the e-mail questionnaire from the ISDG.

After the five weekly meetings concluded, the software was developed and tested during the third (m3), fourth (m4) and fifth (m5) experimental months. Members of the ISDG conducted eight hours of standardized training during the sixth month (m6) at each field office location. At the end of the sixth month, the revenue cycle applications were implemented. The researchers administered a post-experiment survey at the end of the 12th month (m12). Finally post-experiment measures of performance were tracked for 12 months beyond installation, concluding at the end of the 18th experimental month (m18).

While it is difficult to attain a high degree of internal validity in field experimentation, several controls were incorporated into the current study. Field offices were randomized to treatment condi-
tions. Neither ISDG members nor field office supervisors were aware of differential treatments across field offices. The following five factors were held constant between treatment conditions: pre- and post-experiment survey items; weekly topic and related questionnaire; time allocated for participative activities; training sessions; and decision outcome (i.e. the final revenue cycle applications). The procedures by which individuals and group members engaged in participative activities were held constant within each treatment condition. Finally, there were no agency-sponsored meetings or discussions during the experimental time frame where representatives from different field offices could interact with one another.

3.3. Measured variables

Survey items were measured using seven-point, Likert-scales with semantic anchors on both ends. Some items were reversed scored, however, all were converted such that scores of 1 = low and 7 = high. All variables were assessed using two or more items. Reliability estimates for two-item measures were obtained using Pearson’s product moment correlation (r), and reliability estimates for three or more item measures were obtained using Cronbach’s alpha (α) (Cronbach, Gleser, Nanda & Rajaratnam, 1972). Related item measures were collapsed (i.e. averaged) into single variable indices.6

3.4.1. Cognitive factors

The first cognitive factor, number of ideas generated by clerks throughout the five-week participation period, was ascertained by examining comments and suggestions provided by all participants. To accomplish this, we hired three graduate doctoral students, hereafter referred to as graders, to analyze the respondents’ weekly questionnaires. The graders first independently examined the five questionnaires submitted by each respondent to identify and define a common set of 102 discrete ideas. The graders’ initial estimated inter-rater reliability7 was 0.87. After reviewing all items, the graders eventually agreed on a common set of 97 discrete ideas. Next, the graders independently counted the number of discrete ideas provided by each subject. Average inter-rater reliability across all subjects was 0.93. After reviewing and reassessing disputed items, the graders reached full agreement on all subjects.

Three survey items assessed the extent to which subjects believed the process of participating in developing the revenue cycle applications was fair (pre-experiment α = 0.95; post-experiment α = 0.91). The fairness questions were adapted from Lind et al. (1990). For example, one of the three items asked “What do you think about the way in which your agency allows you to participate in developing, modifying, and/or acquiring accounting software applications?” (1 = Very Unfair, 7 = Very Fair). The three items were averaged to form two process fairness indices—one from the pre-experiment survey and one from the post-experiment survey.

3.4.2. Motivational factors

The extent of congruence between desired and actual participation was measured using survey

6 Measured variables were collapsed into indices representing ‘average scores’ to facilitate the SEM analytic approach. The number of survey items used to assess measured variables ranged from 2 to 16 (i.e., for the participation congruence measure, there were eight ‘desired’ and eight ‘actual’ items). Further, there were pre-experiment and post-experiment measures of each variable (except for ‘discrete ideas’), effectively doubling the number of survey items for each variable. Because inter-item reliability estimates were relatively high for all measured variables, collapsing the items into average score indices does not result in a significant loss of information. Additionally, the sample size in this study is minimal for SEM modeling and including all pre- and post-experiment measured items in the model gives rise to power concerns, degree of freedom issues, and over-identification problems. The researchers ran alternative tests using summed indices (rather than averaged), and research findings and interpretations were not significantly changed for any of the hypotheses.

7 Estimated inter-rater reliability was calculated using Cronbach’s alpha, as described in Kerlinger (1986). Essentially, the complete set of discrete ideas initially identified by the raters was first determined (n = 102). Next, the 102 ideas were randomized, to preclude an implied importance rating, and numbered from 1 to 102. Third, each idea in the set that was identified by a particular grader was coded as one (1) and ideas that were not in the initial set were coded as zero (0). After all three raters’ ideas were coded accordingly, a Cronbach’s alpha estimate of reliability was conducted on the assigned values for all three graders simultaneously. All other inter-rater reliability estimates reported in this paper were calculated using the same procedure.
items adapted from Doll and Torkzadeh (1989). Participants responded to eight items asking the extent to which they desire to participate in various activities regarding the development, modification, and/or acquisition of accounting software applications (pre-experiment $\alpha = 0.89$; post-experiment $\alpha = 0.93$). Eight identical survey items were used to assess the extent to which participants actually do participate in these same activities (pre-experiment $\hat{\alpha} = 0.89$; post-experiment $\hat{\alpha} = 0.93$). Participation congruence indices were determined as follows: variable indices were calculated by averaging the eight survey items representing each of the actual and desired participation variables; the actual index was subtracted from the desired index; and the difference between actual and desired indices formed pre- and post-experiment participation congruence indices.

Three survey items, adapted from Bandura (1986), examined participants’ self-efficacy beliefs that they could effectively use the revenue cycle applications. For example, one item stated “I believe that I can effectively use the revenue cycle applications (sales order, cash collection, accounts receivable, and customer billing) to process customer sales order, billing, and payment information.” (1 = Strongly Disagree, 7 = Strongly Agree). The self-efficacy items were averaged to form two indices, one from the pre-experiment survey ($\alpha = 0.92$) and one from the post-experiment survey ($\alpha = 0.89$).

3.4.3. Desired outcomes

Outcome satisfaction was measured using Doll and Torkzadeh’s (1988) end-user computing satisfaction scale. The items adapted for this study assessed how respondents felt about five areas of the revenue cycle applications: system accuracy (2 items); ease of use (2 items); system timeliness (2 items); information content (4 items); and information format (2 items). Inter-item reliability estimates for all 12 items were high (pre-experiment $\alpha = 0.86$; post-experiment $\alpha = 0.92$) and they were averaged to form pre- and post-experiment indices.

Organizational commitment was assessed using the affective dimension of the Meyer, Allen and Smith (1993) scale. For example, one of the six survey items stated, “I would be very happy to spend the rest of my career with this agency” (1 = strongly disagree, 7 = strongly agree). Inter-item reliability was high (pre-experiment $\alpha = 0.96$; post-experiment $\alpha = 0.87$) and the six items were averaged into pre- and post-experiment organizational commitment indices.

Human performance was measured by calculating the quality of sales order and customer billing data entry transactions of each clerk who participated in the study. Each transaction type required a different number of fields in which the clerk must enter data. For example, the pre-development sales order system required users to enter data into 32 fields when adding a new customer and 29 fields when entering a sales order transaction. Assume that a clerk made errors in 44 fields while adding 20 new customers and 73 fields while entering 50 sales order transactions during a given month. The clerk’s monthly data input quality rate in this case would be $0.94 = \frac{2090 - 117}{2090}$. The researchers accessed all monthly transaction files and computed the data input quality rates. However, due to confidentiality concerns, the state agency would not allow the researchers to report the total number of input fields, errors or transaction types entered each month.

3.4.4. Gain scores

Gain scores were computed at the individual level for all variables. Psychological gain scores represent the difference between post-experiment and pre-experiment variable indices. To compute gain scores for sales order and customer billing transactions, we subtracted the average data input quality rate for the final 6 months of the experiment ($m_{12} - m_{18}$) from the average data input quality rate for the 6 month period prior to implementing the new revenue cycle applications ($m_1 - m_6$). Data input quality rates for the first 6 months after implementation ($m_7 - m_{11}$) were not included in the analysis due to observed learning effects.

---

8 Using the 6 month pre-implementation period as the baseline measure, the gain scores yield a relative change in data input quality from pre- to post-implementation.
4. Results

4.1. Sample characteristics

There were a total of 172 participants in the individual condition and 174 in the group condition. Chi-square analyses were conducted to assess whether proportional differences existed between the individual and group modes based on gender, education level, ethnic origin, job category (i.e. sales and accounting), and supervisory performance evaluation. No significant differences were noted, as all p-values exceeded 0.24. Additionally, t-tests were performed to determine the extent to which mean differences existed between the individual and group modes based on age, months with the agency, months with the local office, months in current position, and months in current grade. As shown in Table 1, no significant differences were observed.

There were 46 field offices involved in the experiment. The individual and group manipulations were randomly assigned to 23 field offices each. At the beginning of the experiment, 394 subjects completed the pre-experiment survey. When the post-experiment survey was administered 12 months later, 48 (12%) of the initial 394 subjects were no longer employed by the state agency. The human resource manager of the agency reported a 13.6% turnover for the same 12 months of the prior year; therefore, the 12% attrition rate was not considered abnormal. Of the 48 subjects who left the agency, 22 were in the individual and 26 were in the group conditions. We conducted statistical testing to determine the extent to which demographic factors of the 48 employees who left the agency were significantly different from the remaining sample. No differences were found, as the p-values for all tests exceeded 0.5. The psychological and performance gains reported in this study reflect only the remaining 346 participants.

A total of 60 credit/collection (29 individual, 31 group), 49 cash receipts (24 individual, 25 group), 73 customer billing (37 individual, 36 group), and 164 sales order (82 individual, 82 group) clerks participated in the study. A chi-square analysis was conducted to determine whether there were proportional differences in the types clerks between the two treatment conditions and none were found ($\chi^2 = 0.109$, p-value = 0.9916). In the individual (group) conditions, the mean number of subjects at each field site were 7.47 (7.56).

It should be noted that we did not perform self-reported manipulation checks of each participation condition due to the tight controls surrounding the individual and group treatments. Specifically, on-site supervisors made sure that individuals received the ISDG survey each Friday morning at 8:00 a.m. and answered all questions in isolation. In the group condition, supervisors ensured that group members received the ISDG survey at 8:00 a.m., discussed the survey items in a group setting for one hour, and then responded to the questions in isolation. Tests of the research model and hypotheses are next presented.

4.2. Research model testing

Pre- to post-experiment gains were analyzed using EQS, a SEM program developed by Bentler

| Table 1 |
| Sample characteristics |
| All subjects | Individual mode | Group mode | t Statistic$^a$ | p Value |
| Age (years) | 36.32 | 37.01 | 35.63 | 0.90 | 0.37 |
| Months with agency | 108.84 | 109.85 | 107.83 | 0.12 | 0.90 |
| Months with local office | 105.75 | 106.14 | 105.37 | 0.05 | 0.95 |
| Months in current position | 103.09 | 103.55 | 102.63 | 0.06 | 0.95 |
| Months in current grade | 67.58 | 68.59 | 66.56 | 0.22 | 0.83 |

$^a$ Based on t-tests of individual versus group means.
In this study, the SEM model was designed to test for significant differences in incremental changes in model paths from individual to group conditions following the procedure established by Sorbom (1978). Participation was coded as 0 (individual) and 1 (group) without measurement error. Model paths from participation strategy to cognition and motivation were constrained at zero (0) in the individual condition. Paths from cognition to motivation, cognition to outcomes, and motivation to outcomes were constrained to be equal to the individual condition. Accordingly, standardized coefficients along model paths represent incremental differences in the group, as compared to the individual, condition. The statistical significance of incremental path parameters was tested using the multivariate LaGrange multiplier test (Aitchison & Silvey, 1958). Since there was no theoretical reason to expect differential factor loadings between treatment conditions from measured variables to latent constructs, all factor loadings were unconstrained. Incremental standardized path coefficients, results of multivariate LaGrange multiplier tests on path coefficients, and factor loadings are shown in Fig. 2.

Since there is no generally accepted measure of overall model goodness of fit, leading researchers recommend that multiple criteria be evaluated to determine how well the data fits the model (Breckler, 1990; Wheaton, 1987). In this study, we use five goodness of fit criteria suggested by Bentler (1990) and Schumacker and Lomax (1996).

The first fit index is the chi-square statistic. This index compares the proposed model to the general alternative where all variables are correlated. Statistically significant values reflect a poor model fit. However, in large samples the chi-square statistic is almost always significant because it is a direct function of sample size. The second and third goodness of fit indicators are the normed fit index (NFI) and non-normed fit index (NNFI) as proposed by Bentler and Bonett (1980). The fourth criterion is the Comparative Fit Index (CFI). Bentler (1990) indicates that the CFI works well at all sample sizes and is more stable than the NFI and NNFI because it is less sensitive to sampling error. According to Bentler (1990), NFI, NNFI, and CFI values of 0.90 or greater indicate a good fitting model. Finally, we report the root mean square error approximation (RMSEA) (Schumacker & Lomax, 1996). RMSEA provides an approximation of overall variance unaccounted for in the model and values of 0.05 or less are desirable.

Bentler (1990) suggests that, rather than focusing on one fit index, researchers should look at the collective evidence generated from multiple fit indices to determine the adequacy of model fit. Based on the relative size of the goodness of fit indicators obtained in this study (see Fig. 2), the data appears to satisfactorily fit the research model.

4.3. Means testing

While the SEM model shown includes all 346 participants, there is valid concern that subjects in the group condition were not independent from one another because they discussed relevant issues before responding to the survey instruments. Accordingly, one could argue that, conservatively, the sample size should be 46 (23 field sites per treatment condition) rather than 346. Unfortunately, a sample size of 46 is too small for SEM calculations.
As a way to deal with this concern, the researchers compared the results of psychological assessments (i.e., process fairness, self-efficacy, congruence, satisfaction, and commitment) and objective performance measures (i.e., sales order quality and customer billing quality) for both treatment conditions at the field office level (N=23 per treatment condition). Within the individual and group conditions, post-experiment means were significantly greater than pre-experiment means (p-value < 0.01) for all variables, with one exception. In the individual condition, post- and pre-experiment means for the commitment measure (M = 3.35 and 3.36, respectively) were not significantly different from each other (t-statistic = 0.02, p-value = 0.98).

Post-experiment means were subtracted from pre-experiment means to yield gain scores within
the individual and group conditions. Statistical testing was then conducted to determine whether significant differences existed between the two experimental conditions. As shown on Table 2, results indicate that mean gain scores for the group condition were significantly greater than the individual condition on all psychological and performance metrics.\textsuperscript{11}

### 4.4. Hypothesis testing

#### 4.4.1. Hypothesis one

The first part of hypothesis one (H1a) predicts that, compared to subjects in the individual participation condition, the mean number of discrete ideas offered by group members will be greater. Results shown in Table 2 support H1a. The second part of the first hypothesis (H1b) asserts that pre-to-post-experiment gains in process fairness perceptions will be higher in the group, as compared to the individual, condition. Statistically significant results shown in Table 2 support hypothesis H1b. The last part of hypothesis one (H1c) anticipates that the positive relationship between participation strategy and cognitive factors will be significantly greater in the group condition. Results shown in Fig. 2 support H1c, providing a further indication that group discussion heightened overall cognition for group members, as compared to individual participants. Overall, hypothesis one is fully supported.

#### 4.4.2. Hypothesis two

Hypothesis H2a suggests that pre-to-post-experiment gains in outcome-oriented self-efficacy will be greater in the group, as compared to individual, treatment conditions. Results shown in Table 2 support this proposition. H2b anticipates greater gains for participation congruence in the group, as opposed to the individual, condition. With the congruence measure, zero (0) represents a perfect match between desired and actual participation. Preliminary analysis of mean congruence scores indicated that the pre-experiment level of congruence in both treatment conditions reflected a state of deprivation (actual < desired). The post-experiment level of congruence also indicated deprivation; however, mean congruence within the group condition approached zero. Accordingly, the statistically larger mean gain score in the group, as compared to the individual, condition suggests that the group condition reflected greater movement from deprivation toward congruence (see Table 2). As a result, H2b is supported. The final part of the second hypothesis (H2c) suggests

### Table 2

Results from individual and group participation conditions

<table>
<thead>
<tr>
<th>Individual and group gains (post-minus pre-experiment)</th>
<th>Mean (S.D) Group</th>
<th>Mean (S.D) Individual</th>
<th>t-statistic (p-value)</th>
<th>Degrees of freedom\textsuperscript{a}</th>
</tr>
</thead>
<tbody>
<tr>
<td>H1a-Discrete ideas\textsuperscript{b}</td>
<td>78.74 (8.77)</td>
<td>56.12 (7.26)</td>
<td>9.51 (&lt; 0.01)</td>
<td>44</td>
</tr>
<tr>
<td>H1b-Process fairness</td>
<td>3.60 (0.73)</td>
<td>1.43 (1.91)</td>
<td>5.10 (&lt; 0.01)</td>
<td>44</td>
</tr>
<tr>
<td>H2a-Self-efficacy</td>
<td>2.29 (0.81)</td>
<td>1.05 (1.07)</td>
<td>4.47 (&lt; 0.01)</td>
<td>44</td>
</tr>
<tr>
<td>H2b-Congruence</td>
<td>2.19 (0.74)</td>
<td>0.65 (1.22)</td>
<td>3.88 (&lt; 0.01)</td>
<td>44</td>
</tr>
<tr>
<td>H6a-Satisfaction</td>
<td>2.59 (0.48)</td>
<td>0.87 (0.72)</td>
<td>9.49 (&lt; 0.01)</td>
<td>44</td>
</tr>
<tr>
<td>H6b-Commitment</td>
<td>1.03 (0.71)</td>
<td>-0.01 (0.98)</td>
<td>4.12 (&lt; 0.01)</td>
<td>44</td>
</tr>
<tr>
<td>H6c-Sales order quality</td>
<td>0.0288 (0.19)</td>
<td>0.0125 (0.13)</td>
<td>16.61 (&lt; 0.01)</td>
<td>44</td>
</tr>
<tr>
<td>H6d-Customer billing quality</td>
<td>0.0434 (0.23)</td>
<td>0.0294 (0.14)</td>
<td>9.47 (&lt; 0.01)</td>
<td>44</td>
</tr>
</tbody>
</table>

\textsuperscript{a} Sample sizes for the group and individual conditions are at the local office level (N = 23 each). The local office level mean for each variable is used in the t tests.

\textsuperscript{b} Ideas were recorded by subjects during the five week experimental period; hence, there are no pre-experiment and post-experiment measures.

\textsuperscript{11} The researchers also compared psychological indices and performance measures between treatment conditions at the individual level (N = 346). The direction of pre-experiment to post-experiment gains were the same for all variables under both analyses and statistical differences in gain scores were more pronounced using a larger sample size. Hence, the statistical results shown in Table 2 are representative, yet conservative.
that the relationship between participation strategy and motivational factors will be greater in the group condition. Results shown in Fig. 2 support this proposition. Overall, the second hypothesis is supported.

4.4.3. Hypotheses three, four and five

The next three hypotheses predict that the positive relationships between cognition and motivation (H3), cognition and outcomes (H4), and motivation and outcomes (H5) will be significantly greater in the group, as compared to the individual, condition. As shown in Fig. 2, the three relationships are all positive and significant. Taken as a whole, these findings suggest an incremental, positive contribution of group discussion on desired outcomes. Accordingly, hypotheses three, four, and five are supported.

4.4.4. Hypothesis six

The sixth hypothesis focuses on mean differences in desired outcome measures. H6a, H6b, H6c, and H6d posit increased pre- to post-experiment gains in the group versus individual condition for outcome satisfaction, organizational commitment, sales order data input quality, and customer billing data input quality, respectively. Table 2 shows significantly greater gains in the group condition for all desired outcome variables. Hypothesis six is supported.

4.5. Post-hoc observations

The most compelling results from this study are the performance gains. The graphs shown in Fig. 3 depict sales order (panel A) and customer billing
error rates (number of fields containing errors/total data input fields) throughout the duration of the 18-month experiment. The metric plotted on the graph is equivalent to one minus the data input quality rate. The reason for showing error rates on the graph is because the scale provides a better visual representation of performance gains in the group versus individual condition than does the quality rate. The new revenue cycle applications were implemented at the beginning of the seventh month (m7). The overall decline in error percentages for months 7–12 appear to reflect learning curves in both participation conditions. Because learning curve effects were indicated, we used the first and last six months of the 18-month study period to evaluate pre- to post-experiment changes in performance.

The researchers are aware of only one systematic difference between treatment conditions throughout the duration of the experiment, i.e. the individual and group participation modes. The overall decline in error percentages could be partially explained by significantly improved revenue cycle applications, since the new applications were standardized throughout the agency. However, because the outcome was held constant in this study, we believe that the experimental manipulations are primarily responsible for the observed, significant, between-treatment performance effects.

We analyzed the content of the discrete ideas from all study participants to determine whether the input provided by group members was more instrumental in determining the form and substance of the final application than was the input provided by subjects in the individual condition. This is an important point because if group members perceived a greater degree of objective control over the newly developed applications than did individual participants, this factor could partially or wholly explain observed outcome effects.

To accomplish this, the three graders examined the newly designed revenue cycle applications. Using the previously identified set of 97 discrete ideas offered by users, the graders were asked to identify the number of ideas that were actually incorporated into the applications. Initial interrater reliability was 0.93 and all differences were subsequently resolved. The graders determined that 49 of the 97 ideas were subsequently manifest in the system. A further analysis by treatment condition found that the 49 system attributes were suggested by 146 (85%) of subjects in the individual condition and 158 (91%) of group members. A chi-square test indicates that these proportions are not significantly different ($X^2 = 0.24$, $p$-value = 0.63).

In order to obtain additional evidence in this regard, in the post-experiment survey we asked subjects the extent to which they believed their preferences, suggestions, comments, and ideas were actually incorporated into the newly developed revenue cycle applications (1 = no extent, 7 = great extent). We adapted three survey items from Lind et al. (1990) to measure this construct (α = 0.88) and averaged the responses to obtain an instrumental control index. Mean responses of 5.08 (individual condition) and 4.12 (group condition) were significantly different ($t = 3.53$, $p$-value = 0.02).

Evidence gathered by counting actual number of ideas incorporated into the new system and from the instrumental control index diverged. The former suggests a slightly higher, although not significant, perception of control by group members whereas the latter indicates a significantly higher level of perceived control by individuals. Accordingly, there does not appear to be a bias toward rejecting the null hypotheses based on instrumental control perceptions.

5. Discussion

The current study investigates the psychological and behavioral impact of group discussion when accounting information system users provide design specification suggestions to system developers. Research findings indicate increased human performance and improved user attitudes from group members, as compared to individual users who were not allowed to discuss relevant issues with peers before submitting suggestions to system developers. The attitudinal improvements per-
sisted six months after system implementation and the behavioral gains were observed 12 months after implementation. These remarkable, longitudinal results obtained in a field setting provide compelling evidence that accounting professionals should seriously consider the use of group discussion in a variety of accounting-related problem and decision domains. The current research also offers theoretical advances to accounting, small group, and organizational behavior literatures.

A key strength of the current study was the use of structural equation modeling (SEM). The mathematical advantage of SEM is that it simultaneously considers a measurement model (i.e. factor loadings of measured variables on latent constructs) and a structural equation model (i.e. direct and indirect relationships among latent constructs), while providing overall model fit indices. The theoretical advantage of using SEM in this study is the keen insight it provides into the psychological impact of group discussion on group members. As a result, rather than referring to elusive synergistic effects of group participation, SEM results obtained from the current experiment provide a clearer picture of the underlying, mediating influences of cognition and motivation on desired outcomes. Deeper understanding of the critical roles played by cognitive and motivational factors in small group discussion serves to explicate the concept of synergy.

Even with such positive results, there are potential limitations to this research. First, caution should be taken in generalizing these results outside of this agency since each workplace setting differs. Second, there could have been some resentment from one condition to the other arising from differential treatments. The field offices are quite autonomous in all respects and the researchers are unaware that subjects in one condition knew of differential treatments. The field offices are quite autonomous in all respects and the researchers are unaware that subjects in one condition knew of differential treatments; however, we acknowledge that the problem might have been present to some unknown extent. Third, subjects in the individual condition may have discussed their participative input with peer employees after sending their suggestions to the ISDG. While this was likely to have occurred to some extent, we attempted to control this factor by revealing each week’s topic simultaneously to all subjects at 8:00 a.m. each Friday morning. Finally, subjects in the group condition met for 2 h as a group and then each member responded to the ISDG, which took about another hour. Therefore, group members participated about 2 h per week. However, subjects in the individual condition responded to the ISDG questionnaire in about 1 h without discussion. The differential amount of time between conditions may have had an impact on cognitive, motivational, and outcome variables, independent of the group manipulation.

In the current business environment, where decreasing resources, re-engineering, and downsizing are common, improving individual and organizational effectiveness are key factors in remaining viable and competitive in the marketplace (Boyett & Conn, 1991). Accounting professionals can become value-added players in this arena by facilitating and participating in tax planning, budgeting, auditing, systems developing, and business consulting activities. One means of maximizing the effectiveness of these activities is through the use of group participation strategies (Scholtz, 1996). On the surface, the use of group participation may be considered less efficient than individual participation, particularly due to the increased consumption of time and human resources dedicated to issues such as coordination and control, group socialization, group discussion, and conflict resolution. However, results from the current study indicate that the long-term benefits of group participation may more than offset efficiency considerations.

Hopefully, this study has opened the door to a rich stream of ideas and questions to be investigated by accounting researchers. For example, in the area of group research, the following set of questions represents but a small sample of potential inquiries:

1. Are there accounting-related problem and decision domains where individuals can outperform groups?
2. What types of human biases surface during group discussion that may serve to diminish discussion quality?
3. Do groups continue to demonstrate advantages over individuals in other phases of
decision-making, such as alternative generation and selection?
4. Does the hierarchical group decision-making structure prevalent in most auditing contexts result in higher quality decisions than other structural forms of collective decision-making?
5. How can accounting professionals best utilize information technology to facilitate collective discussion and problem solving in virtual group environments?

Finally, there is an emerging area of assurance services that calls for future research related to designing accounting and management information systems. The AICPA special committee on assurance services has identified ‘information systems reliability’ assurance as a critical service that CPA’s can provide (AICPA, 1999). One aspect of this new assurance service concerns the integrity of on-going systems development processes. Under the traditional systems reliability model, accountants tend to ignore development processes, wait until the system is implemented, search for errors, and then suggest corrective measures. The modern model of systems development demands quality-by-design. Under the new model, quality must be built into the accounting information system up-front. In order to provide assurance services over systems design process, CPA’s would have to engage in rigorous and continual reviews throughout the systems development life cycle. The special committee on assurance services recognizes that CPA’s must acquire new knowledge and skills in order to provide this critical service to the public.

Accounting researchers can help to further the profession along this avenue by learning more about how to best incorporate user-input activities into development processes with the objective of maximizing the ultimate quality of accounting information systems. While the current research project suggests that group discussion among familiar, peer system users enhances the quality of data input transactions, there are many lingering issues confronting accounting researchers in the areas of user participation and related information systems reliability issues.

References


