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Abstract

Today's complex business environment calls for both collaborative work and creative (novel) thought in organizational operations. This research evaluates small group performance in generating novel ideas with three different types of support: Group Support Systems (GSS) software, Creativity Support Systems (CSS) software, and no computer software support tools. All-female, all-male, and mixed gender groups are compared in these three support settings. A 3 X 3 completely randomized factorial design with repeated measures was used. Consistent with our hypothesis, the results of the study indicate an interaction effect between group support tool and group gender composition. Specifically, this study reveals that same gender groups (both female and male) generate more novel ideas when no computer software support is present. For mixed gender groups, however, computer software support is essential for novel idea generation. Computer software support appeared to mediate the undesirable consequences of group interaction associated with mixed gender groups.

Introduction

Today's complex business environment calls for both collaborative work and creative (novel) thought in organizational operations. Toward these ends, Group Support Systems (GSS) software was designed to enhance group collaboration and Creativity Support Systems (CSS) software has been designed to improve creative performance. Along with providing an organized forum for group activity, these software support tools may help overcome some of the limitations of traditional group interaction including difficulties associated with gender composition. This research evaluates small group performance in generating novel ideas with three different types of support: GSS, CSS, and no computer software support tools. All-female, all-male, and mixed gender groups are compared in these three support settings. When group gender composition is considered, this study reveals that same gender groups (both female and male) generate more novel ideas when no computer software support is present. For mixed gender groups computer software support is essential for novel idea generation. In fact, the utilization of Creativity Support Systems (CSS) software results in the most novel ideas in mixed gender groups.

Group and Collaborative Work

Studies have shown that individuals working in groups generate more ideas than when they work alone (Nunamaker et al., 1991). Individuals in a group have more information, learn from others in the group, and are stimulated by the ideas of others thus resulting in synergy (Osborn, 1963) or cross-fertilization (Hughes, 1963) of ideas. The group process also provides for a wider margin of error for individuals (McGrath, 1984).

Group work, however, is notoriously unproductive (Shaw, 1981). Group meetings are fraught with weaknesses (Diehl and Stroebe, 1987; Lamm and Trommsdorff, 1973). Group members may fear speaking in public or having other members publicly comment on their ideas. Objective evaluation of ideas may also be a problem in a face-to-face group setting. Other disadvantages include dominance of the discussion by one or more members, or extreme influence of high-status members. In addition, all groups contain a certain amount of pressure for conformity and an associated low tolerance of minority or controversial opinions.

Procedures have been proposed to facilitate group interaction and reduce conflict (structured group management techniques; see, e.g., Ulschack et al., 1981) and to foster creative thinking (creative idea generation; see, e.g., Van Gundy, 1984). Many of these techniques have been incorporated into GSS or CSS software.

These two kinds of software have been developed for two very distinct purposes and their features reflect this difference. GSS, with its anonymity feature, was created to encourage deliberation in groups, and it is restricted to groups utilizing a network of computers. The objective of GSS is to improve the group decision making process by removing barriers and providing a spectrum of tools and techniques to facilitate the decision making process (DeSanctis and Gallupe, 1987).

CSS (which are newer than GSS) were designed to motivate creative thinking by encouraging its users to think outside their normal parameters (Evans, 1991; Van Gundy, 1992; Winship, 1991). Studies done by Elam and Mead (1990) and Lobert (1993) indicate that the use of computer software support may enhance, as well as undermine, the creative process. Recent work by Massetti (1996) found ideas generated with the aid of CSS to be more novel and more valuable than those that did not use computer software support. Unlike GSS, CSS is designed for individual or group use in stand-alone or network set-up.

Gender Effects

Studies of group interaction have determined that group gender composition has an effect on the processes and outcomes of a group (Aries, 1976; Martin and Shanahan, 1983). Sex role differentiation theory (Marby, 1985), status and expectation states theory (Meeker and Weitzel-O'Neill, 1977), and structural and numerical proportions theory (Kanter, 1977) have been proposed to explain the group processes and predict the outcomes that are attributable to group gender composition. Moreover, considerable evidence indicates that the effects of gender composition are so pervasive and subtle that they are activated merely by visual perception (Berman, O'Nan and Floyd, 1981; Frank and Katcher, 1977).

The complexity of the issue and the variability of what can be studied lead to inconclusive proof for any specific theory. However, there is empirical support for the proposition that group gender composition affects group interaction and, therefore, group outcome. For example, evidence suggests that interventions by a group leader, experimenter, or technology can successfully counteract many otherwise undesirable effects of a group's given gender configuration (Herschel, 1994; Lockheed and Hall, 1976; Ridgeway, 1982).

Research Framework

For studying technological support for groups, this research framework combines the information processing perspectives of Bostrom et al. (1987) and Pinsoneault and Kraemer (1983). As for the creative idea generation aspect of this study, the framework incorporates the models proposed by Fellers and Bostrom (1993) and Woodman et al. (1993). Accordingly, this framework has four components: the input phase, the process phase, the output phase, and the contextual factor. The input phase consists of identification of group gender composition and intervening and adaptation factors. The process phase includes a choice among several group support tools available to the group. The output phase contains the idea(s) generated for an information system. The contextual factor includes the environment or task of the study. The dynamic relationships among the components are shown in Figure 1.

Hypothesis tested: There is an interaction effect between the type of group support tool utilized and the gender composition of the group in the production of novel information system ideas.

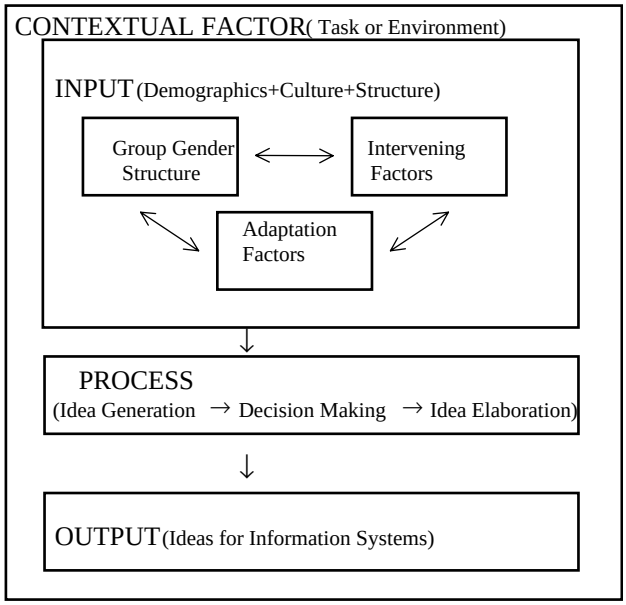

Figure 1. A Framework for the Study of the Impact of Group Support Tools on Information System Idea Generation by Different Gender Groups

Research Methodology

A 3 X 3 completely randomized factorial design with repeated measures was used. The two independent variables were Group Support Tool (GSS software, CSS software, or no computer software support) and Group Gender Composition (all-female, all-male, or mixed gender groups). Groups consisted of three to five randomly assigned participants. Participants were undergraduate students in business or business-related courses at a large urban northeastern university. Groups were randomly assigned to the nine experimental categories.

Each group was assigned the same task. The task utilized was an information system idea generation project for a sit-down fast-food restaurant. Specifically, each group was asked to propose an information system innovation in order to retain old customers as well as attract new ones. The experimental task chosen was semi-structured to permit flexibility and novelty and did not depend on special skills.

At the experimental session, the participants in the group were presented with a handout. The handout contained a consent form, an initial questionnaire, task description, instructions for idea generation using the particular experimental group support tool, and a follow-up questionnaire. The GSS and CSS experimental sessions were conducted in a computer laboratory, and the no computer software support experimental sessions were conducted in a faculty conference room. All experimental sessions were facilitated by the same facilitator to balance any facilitator effects that might affect the group interaction and outcome. The dependent variable was a single idea that each group was required to reach by consensus.

The dependent measure, novelty, was assessed through ratings by five independent expert judges in the information systems domain. The Creativity Evaluation Questionnaire was used by the judges' to evaluate each group's single consensus-generated idea on thirteen items, including novelty.

Results and Discussion

There are four aspects to creativity: the idea itself, the person who generates the idea, the process used to form the idea, and the environment in which the idea is developed (see MacKinnon, 1978). This paper examines the process that yields the most creative idea, and utilizes the consensual assessment approach of Amabile (1987) to evaluate the creativeness of a product. This inter-judge method has experts in a particular domain use their implicit criteria to evaluate products related to that domain.

The reliability of the judges' ratings was evaluated. For internal consistency, Cronbach's coefficient alpha (a=.9509) was used. For determining the agreement among several judges, Kendall's coefficient of concordance *W* measure (*W*=.3571) was employed. Cronbach's coefficient alpha test and Kendall's coefficient of concordance *W* indicate agreement among the judges as to the relative level of creativity present in all the solutions evaluated for this study, thus justifying the averaging of the judges' scores. The analysis used to test the hypothesis used averaged novelty scores from the Creativity Evaluation Questionnaire.

Using Analysis of Variance technique to test for the hypothesized interaction effect of group support tool and group gender composition in the production of novel information system ideas revealed a statistically significant interaction for the novelty item (p=.036). Graphical inspection, illustrated in Figure 2, of the novelty cell means provides insight into this interaction of group support tool and group gender composition. The pattern of cell means for groups with computer software support is different from the pattern of cell means for the groups provided with no computer software support. Mixed gender groups performed better when computer software support was present, with the most novel ideas presented when CSS software was utilized. Same gender groups performed differently (and better) when no computer software support was present.

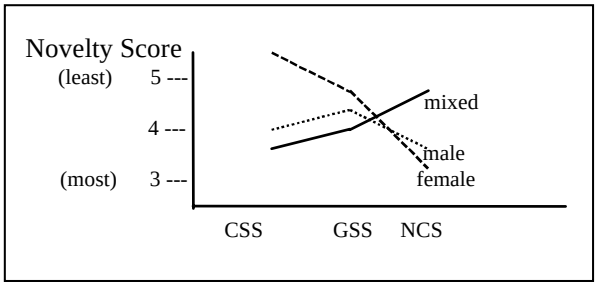

Figure 2. Graph of Cell Means for the Novelty Item

The results of this study are consistent with some of the findings from studies of gender and groups and computer group support literature. As expected, there was an interaction effect for group gender composition and group support tool utilized. Computer software support appeared to mediate the undesirable consequences of group interaction associated with mixed gender groups.

As organizations seek to develop novel ideas for information systems for strategic positioning, it is critical that groups seeking novel information system solutions be provided with appropriate group support tools. The results of this study indicate that for same gender groups, novel information system idea generation is at its best when no computer software support is present. However, when groups are composed of both females and males (mixed gender groups) computer software support is essential to balance the difference associated with mixed gender group interaction. Thus, the group support tool of choice is CSS for the most novel information system ideas in mixed gender groups.

References

Available upon request from the first author (ekksi@cunyvm.cuny.edu).