

# Academic Risk-Taking and CSCL

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## Abstract

Risk shift is a group consensus achieved through social interaction which tends to be more risky than the average decision of the individual members of the group. In the present study, the principle of risky shift was constructively applied to 137 elementary students working with a computerized mathematics task to increase their academic risk-taking behavior. Results of the study show that the observed risky shift in the educational situation was most likely caused by the problem-solving information shared among group members. It is proposed that an integration of risk-taking and computer supported collaborative learning environment will benefit students' learning and cognitive development.

**Keywords** — academic risk-taking, collaborative learning, drill-and-practice computer program, mathematics, modeling, self-efficacy.

## 1. Perspectives and Theoretical Framework

Psychologists have been explaining the risk shift phenomenon with several hypotheses. "Diffusion of responsibility" theory explains risky shift in terms of group members' feelings that in the case of failure, the entire group, rather than the individuals, will be blamed. "Value" theory contends that risk-taking is regarded as a valuable characteristic in American society; that group members tend to manifest a risky opinion as part of their cultural conditioning. "Familiarization" theory suggests that in a group, members have an opportunity to obtain more information about tasks, situation, and strategies, so they become bold in decision-making.

Guided by psychological theories and research, academic risk-taking has been demonstrated as a means to enhance students' learning and motivation. It has been postulated and demonstrated that moderate risk-taking maximizes satisfaction (Atkinson, 1957), enhances self-efficacy (Bandura, 1977, 1986), elicits constructive attributions (Meyer, Folkes, & Weiner, 1976), provides valued competence information

(Trope, 1975), and ensures attention, concentration, persistence, and process-orientation (Csikszentmihalyi, 1990). Recent research has identified several task-related and individual difference variables, such as task objective, task criterion, task familiarity, payoff, and tolerance for failure, that affect risk-taking (Clifford, 1991). One variable that has not been explored is social environment of risk-taking, in particular a computer supported collaborative learning (CSCL) environment.

Social cognitive theorists contend that people can acquire knowledge, skills, strategies, beliefs, and attitudes by observing and imitating models (Bandura, 1977; Schunk & Gunn, 1985; Zimmerman & Ringle, 1981). They also demonstrated that both live models, who appear in person, and symbolic models, which are presented via instructions or audiovisual displays, are influential in observational learning. It can be expected that we can increase students' risk-taking by presenting a risk-taking model.

Another social environment variable is the social context of risk-taking, that is, whether the risks are taken individually or collaboratively. Based on research of risky shift (Harrell, 1991; Knowles, 1976; Turner & Cashdan, 1988; Wallach, Kogan, & Bem, 1964), it can be predicted that students will take higher risks in a collaborative risk-taking situation than in an individual risk-taking situation. This collaborative learning situation can be easily created and supported by using a computer as a learning tool.

General findings concerning the effectiveness of CSCL have been widely published. While King (1989) found no significant relationship between group ability level and success in a study of fourth graders engaged in computer-assisted problem solving, she did identify different patterns of verbal interactions between groups who were successful or unsuccessful in solving the problems. Hooper and Hannafin (1988) formed homogeneous or heterogeneous groups of low- and high-ability eighth grade students to complete a computer-assisted mathematics tutorial. Low-ability students in heterogeneous groups consistently outscored low-ability students in homogeneous groups. In a similar study with high- and average-ability fifth and sixth grade students, re-

sults indicated that students who worked in pairs learned more effectively than individuals across ability groups (Hooper, 1992).

However, none of previous studies investigating risk-taking or CSCL focused on increased risk-taking on school related tasks in a CSCL environment. If the principle of risky shift is applicable to students' academic risk-taking behavior in CSCL, it can be predicted that students will take higher risks in a collaborative risk-taking situation than they do in an individual risk-taking situation. It also seems that a drill and practice type of computer program would be a good tool to provide a CSCL environment for research where we can measure whether students will take higher risks in a cooperative situation or in an individual situation in order to solve problems.

In the present study, variables of modeling and social context were manipulated to examine the effects of these variables on students' risk-taking and the proposed explanations for risky shift in a CSCL environment using a drill and practice type of computer program.

## 2. Method and Data Source

Seventy-five third grade and 62 fourth grade students, 71 boys and 66 girls, participated in this study. Materials used in this study were (1) the Academic Risk-taking (ART) math computation task, programmed in HyperCard for Macintosh computers and (2) a questionnaire to assess students' feelings in the collaborative and individual risk-taking situations.

Students selected their own difficulty level to solve the problem in the ART program until they made 10 selections. Students' selections and performances were recorded by the computer to yield two dependent variables—difficulty and accuracy. The ART program also manipulated the modeling variable. A short story about a student's attitude toward risk-taking in academic situation was shown on the screen only to the students in the modeling condition. Subjects were randomly assigned to the modeling and non-modeling conditions. The variable of collaborative context was manipulated as a within-subject variable. In the collaborative situation, the subjects were instructed to work on the problems collaboratively and to reach the agreement on the answers before entering them. After the completion of the ART in each session, the questionnaire was administered. The questionnaire contained 12 statements on a 6-point Likert scale. The instrument yielded three scores: perceived responsibility, value of risk-taking, and familiarization of problem-solving. Data were collected in two sessions with a one week interval between the sessions.

## 3. Results

Difficulty scores in the individual and collaborative context were analyzed via a 3-way ANOVA with a within-subject variable of context and between-subject variables of modeling and grade. In addition to an expected main effect for grade (i.e., that 4th graders selected more difficult problems than 3rd graders), a significant context main effect was found,  $F(1,133) = 13.47, p < .001$ . As predicted from the risky shift research, students selected harder problems to work in the collaborative context ( $M=4.31$ ) than did they in the individual context ( $M=3.88$ ). For accuracy, the only significant effect found was the main effect of grade,  $F(1,133) = 6.56, p < .01$ , indicating third grade students selected problems resulting in lower accuracy than did the fourth grade students (means were 40 and 50, respectively).

Supporting the theories of "diffusion of responsibility" and "familiarization", subjects in the collaborative context felt less responsible for the risks they took ( $M=3.18$ ),  $F(1,124) = 4.00, p < .045$ , and obtained more information relevant to problem-solving ( $M=2.33$ ),  $F(1,124) = 5.48, p < .021$ , than they did in the individual context (means of 3.35 and 2.01 for perceived responsibility and familiarization, respectively).

## 4. Conclusion

Differing from previous research on risky shift where researchers focused on unhealthy behaviors such as shoplifting or gambling, this study applied the principle of risky shift in a constructive way to encourage students to select challenging tasks in their academic activities. Furthermore, this study provided explanations for risky shift in computer supported learning environment. Students in a computer supported collaborative risk-taking context tend to take higher risks because they feel less threatened by the consequences of failure, a finding consistent with research showing that students take high risks when external constraints are reduced. Also, students in the computer supported collaborative context took higher risks because they felt they gained information from each other by working as a collaborative learning group, a finding consistent with that in economics research that information reducing ambiguity increases risk-taking (Ellsberg, 1961).

Practically, this study shows an advantage of CSCL that has not been reported in previous research. Research has shown that collaborative learning is an effective method of increasing student achievement in various subjects and improve attitudes toward classmates and themselves (Sharan, 1980; Slavin, 1990;

Stevens, Madden, Slavin, & Farnish, 1986). Findings from this study suggest that collaborative learning should also be used as a means to encourage students to take risks in their academic tasks. Teachers and developers of collaborative learning projects should integrate opportunities to encourage risk-taking in the collaborative learning environment whenever possible. Also, as the familiarization factor suggests, teachers should encourage and enhance students' information exchange within collaborative learning environment, which will make them feel more comfortable with the problem space and more confident of their ability to solve problems. Computers are able to create this collaborative environment easily and appropriately without the presence of a teacher to provide immediate feedback. Using computers for drill and practice had an advantage of not delaying providing feedback on students' wrong answers until the next day, which usually happens in homework assignments. The computer's immediate feedback encouraged the students in the collaborative context to compare their solutions and discuss where the mistakes occurred, and even establish a peer coaching environment. The immediate positive reinforcement that the students who solved the problem correctly received seemed to encourage them to challenge themselves with a higher level of difficulty. Therefore, we believe that the integration of risk-taking opportunities into CSCL environments will benefit students' learning and cognitive development, although future research is needed to investigate this relationship.

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