

Studying the Effects of Scripts and Technology on Cooperative Learning

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Abstract: The experimental study investigated the effects of a cooperation script with technology and face-to-face forms of group learning. The results revealed that the use of scripted cooperation and the scripted-unscripted sequence for instructions had a positive effect on group-efficacy. When face-to-face groups used scripted instructions they felt more satisfied with discussion process than when using unscripted instructions. In contrast, computer mediated groups felt equally satisfied when using both forms of instruction.

Introduction

Education is a social process, and social interaction among students is regarded as a critical variable in learning and cognitive development (Harasim, 1990) at all education levels. Computer-mediated communication (CMC) technologies offer potential for including many forms of social interaction in online learning contexts. There has been a major challenge for distance educators to develop instructional strategies which can effectively cultivate a consistent level of interaction and sustain the interaction in online learning environments (Muirhead, 2004). Research is needed to help examine what instructional strategies can be used to support high quality interactions in online learning so as to produce improved learning outcomes in higher education. Kreijns (2004) has suggested using traditional classroom-based cooperative techniques as a starting point to reexamine if classroom-based cooperative techniques are equally effective in computer-mediated contexts. Scripted cooperation uses a script to offer a procedural structure, where every step of the cooperation is prescribed so as to promote the occurrence of the desired cognitive processes and reduce the occurrence of negative social processes (O'Donnell & Dansereau, 1992). In face to face contexts, laboratory studies have shown that students who use scripted cooperation consistently outperform those who work alone and they also report positive attitudes toward their partners and collaboration (O'Donnell, 1992). Cooperation scripts developed and tested in face-to-face learning settings have potential to facilitate cooperative learning in computer mediated learning environments. Early results of research show that cooperation scripts may be effective when used in computer-mediated settings (Weinberger, Ertl, Fischer & Mandl, 2005). The purpose of the experimental study was to investigate the influence of cooperation scripts on achievement, group-efficacy, and satisfaction with group discussion process across technology-based or face-to-face contexts.

Methodology

The sample of the study was undergraduate students enrolled in a large lecture introductory course. Participants were randomly assigned into small groups of three members. Before the study, a demonstration of Blackboard and a small activity of using those online tools were provided to all the students to get familiar with the relevant online tools. In the study, two different case studies each lasting one week were utilized as an outside class assignment. Each case study was designed with a cooperation script condition and a non-scripted cooperation condition. Students who received the first case with a cooperation script received the second case without a script and vice versa. The scripted instruction adopted from Weinberger (2003) was designed to have group members play two roles, an analyst for one question of a case and a constructive critic for the other two questions. All groups in the technology context of the course were instructed to use a discussion board and an email tool embedded in Blackboard to perform their small group activities whereas their counterparts in face-to-face groups performed without technology. The collected quantitative data included student examination scores and survey data. A four item group efficacy scale adopted from Salanova, Llorens, Cifre, and Schaufeli (2003) and a five item process satisfaction subscale from Green and Taber (1980) were administered after each assignment through a web based

survey. All items on the questionnaires are rated on 7 point Likert scales (1 = strongly disagree to 7 = strongly agree). 200 students from the class volunteered to participate in the study by signing the consent form. The response rate for the first and second motivational survey was 94.5 % (188 of 200), and 88.3 % (167 of 188) respectively. After examining accuracy of data entry, missing data, univariate and multivariate outliers and manipulation checks for fidelity to the between-subjects treatments, a total of 88 participants were included in the final analysis.

Findings

The reliability coefficients of group efficacy and process satisfaction on the full dataset were 0.84 and 0.76 respectively. Paired T-tests comparisons were conducted to examine whether there was statistically significance the change in measurements for each outcome variable at the two time points. The results showed significant increases on group efficacy and satisfaction, and a decrease on test scores indicating a confounding time effect on each outcome variable. In order to remove the confounding time effect, adjustments were made for three outcome variables. Two approaches for adjustments were adopted. The computation of z scores for each task was carried out on examination scores while the deviation scores for each task were used for group efficacy and satisfaction. Prior to the analyses, a sequence variable defined as students that received the unscripted treatment first versus the students that received the scripted treatment first was added into the analysis. Three separate repeated measures analysis of variance (ANOVA) with technology implementation and sequence as between-subjects variables and cooperation script as the within-subjects variable were performed to examine differences among the four treatments on the z scores of examination scores on each task and the deviation scores of motivational and affective measures from the mean value on each task. Examining the within-subject effects on examination scores, group efficacy and process satisfaction reveals that the main effects for cooperation scripts on group efficacy were significant, $F(1, 84) = 4.934, p < 0.05$ ($M = 5.90$ in the unscripted treatment vs. $M = 6.04$ in the scripted treatment). The result of between-subjects effects for the technology implementation variable achieved statistical significance for process satisfaction, $F(1, 84) = 5.117, p < 0.05$ ($M = 5.873$ in f2f groups vs. $M = 5.494$ in online groups). The interaction effect between Cooperation script and Technology on process satisfaction is significant, $F(1, 84) = 4.506, p < 0.05$ ($M = 5.729$ in the unscripted treatment and $M = 6.000$ in the scripted treatment for face-to-face groups vs. $M = 5.615$ in the unscripted treatment and $M = 5.373$ in the scripted treatment for computer-mediated groups). Simple effects analyses revealed that the effect of cooperation script was significant in the face-to-face groups, $F(1, 33) = 5.713, p < 0.05$ and was not significant in the computer-mediated groups, $F(1, 33) = 1.724, p > 0.05$. Additionally, the main effect of sequence on group efficacy is significant, $F(1, 84) = 6.85, p < 0.05$ ($M = 5.77$, in the unscripted - scripted sequence vs. $M = 6.13$ in the scripted - unscripted sequence).

Discussions

The purpose of the study was to examine the effect of cooperation script and technology implementation on achievement, group efficacy and process satisfaction of college students who participated in small group cooperative learning. In the study, students in both face-to-face and computer mediated groups scored similarly on achievement and motivation measures. Of note is that the face to face grouping shows no advantage over the computer mediated grouping on academic performance, and this finding is consistent with previous literature (e.g. Francescato, Porcelli, Mebane, Cuddetta, Klobas, & Renzi, 2006). Scripted cooperation has shown a positive effect on student's cognitive outcomes in face-to-face learning context (O' Donnell, Dansereau, Hall, & Rocklin, 1987; O'Donnell, 1996). However, prior research by Weinberger et al (2005) and Weinberger, Reiserer, Ertl, Fischer, & Mandl (2005) has shown that the individual acquisition of knowledge in a computer-mediated unscripted condition was better than in a scripted condition. The current study shows that there is no advantage for scripted cooperation over unscripted cooperation on examination scores in face-to-face groups and computer mediated groups. While some research suggests that cooperation scripts might de-motivate learners due to the strict regulation of social interaction (Rummel & Spada, 2005), the results of this study indicate that students receiving scripted instruction perceived higher group-efficacy than those receiving unscripted instructions. The sequence of receiving scripted and unscripted instruction had its impact on group efficacy of students. Students receiving instructions with the unscripted-scripted sequence perceived less group efficacy than those with the scripted-unscripted sequence. Additionally, face-to-face groups employing the scripted instruction felt more satisfied with their discussion process than those with the unscripted instruction. In contrast, computer mediated groups employing the unscripted instruction were as satisfied with the discuss process as when employing the scripted instruction. In summary the key findings are that cooperative learning was shown to be as effective in a computer mediated context as in a face to face context for both achievement outcomes and motivational attributions, and that the use of scripts support student efficacy for learning both in face-to-face groups and computer-mediated groups but has an advantage for

process satisfaction only in face-to-face groups. These findings provide support for educators concerned with using cooperative learning techniques in online and distance learning environments and provide new evidence for advancing theory about how scripts influence outcomes and motivation in cooperative learning.

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