Effect of Process-Oriented Roles in Small Group Online Learning

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Abstract: *Inefficiency in students' group interaction limited the value of group learning in educational practices. This study proposed an intervention strategy of assigning process-oriented roles to students in an online group learning environment to facilitate group cognitive, metacognitive and socio-emotional processes. An experimental study was designed and implemented to evaluate the effectiveness of the intervention strategy. Results obtained evidence to its feasibility and usefulness.*

Keywords: small group learning, group interaction, role assignment, group processes

1. Introduction

Small group learning is a form of instruction widely advocated in schools around the world and has drawn constant attention in educational research (Webb, 2009). In group learning contexts, students' interaction is a key factor in determining the magnitude of benefits students can gain. The inefficiency in students' group interaction has limited the value of group work in educational practices (Webb, 2009; Blatchford, Kutnick, Baines, & Galton, 2003). To address the challenge, researchers have devised various pedagogical approaches such as assigning roles to improve group interaction. However, there lack studies on theory-driven design of systematic support for group interaction. This study proposed and evaluated an intervention strategy of assigning process-oriented roles to students in an online group learning environment to enhance group cognitive, metacognitive and socio-emotional processes. An experimental study in an authentic teaching and learning setting of a college course was designed and implemented to evaluate the effectiveness of the intervention strategy.

Roles are prescribed functions that guide individual behavior and facilitate group collaboration (Morris, et al., 2010). In prior studies, roles were mainly used only for cognitive and metacognitive functions. For example, De Wever, Van Keer, Schellens and Valcke (2008) defined five functional roles as starter, moderator, theoretician, source searcher and summarizer to pre-structure students' collaboration activities. Strijbos, Martens, Jochems and Broers (2004) suggested four procedural roles as project planner, communicator, editor and data collector to prescribe students' group activities. Morris et al. (2010) proposed four reciprocal teaching roles, i.e., summarizer, questioner, clarifier, and predictor for self-regulatory group processes.

Role assignment was reported to be correlated with level of knowledge construction students reached in distance groups (Schellens, Van Keer, & Valcke, 2005; De Wever, Van Keer, Schellens, Valcke, 2008). Role assignment was also found to have interactional benefits for students in terms of being more awareness of group efficiency, stimulated group task coordination, and increased amount of task-content focused statements in group discussion (Strijbos, Martens, Jochems, & Broers, 2004). In Hogan (1999), assigning roles of socio-emotional, conceptual and metacognitive functions was indicated to influence individual students' perspectives on learning and the levels of group reasoning.

2. Research Design

This study designed and evaluated an intervention strategy of assigning three process-oriented roles, i.e., group cognitive leader, group metacognitive leader, and group socio-emotional leader, to students in an online group learning environment for enhancing group interactive learning. The intervention strategy was proposed based on the frameworks and taxonomies of group processes that consistently described essential aspects of group processes in three dimensions, i.e., group cognitive activities, group metacognitive activities, and group motivational and emotional activities.

The research method used in this study is one factor (assigning roles vs. without assigning roles) between subject design. 85 undergraduate students from three classes participated in the online group learning. The students were randomly grouped into triadic groups within their own class, and two classes were assigned as the experimental condition and the other one as the contrast condition. In the experimental condition, students in each group were randomly assigned one of the three roles. The group cognitive leader took the duties of initiating and encouraging group members' socio-cognitive interaction including information sharing, argumentation, integration and convergence of discussion, critical thinking, and exploration. The group metacognitive leader was in charge of facilitating and coordinating the group regulatory activities including goal setting, task planning, progression monitoring, and reflection on group performance. The group socio-emotional leader was responsible for maintaining a positive group atmosphere by way of encouraging morale-building communication and emotion regulation. In the contrast condition there was no assignment of process-oriented roles but only a general group leader.

The online group learning platform was a collaborative concept mapping environment. In the platform, each group was provided with a task instruction environment and a task solution environment to complete five group tasks using collaborative concept mapping. Before the experiment began, a serial of trainings regarding the main components of group work, like role duties, guidance for ethical group communication, concept mapping skills, and collaborative concept mapping strategies in Cmaptool, were implemented. A pre-test survey was administered to collect students' background information as well as relevant knowledge, skills, and attitude (KSAs) including knowledge of cognition, computer skills, communication skills, attitudes towards online learning, and attitudes towards small group learning. After each group task session, each group was required to give self-rating of their performance. After all the group tasks were finished, a post-test survey was implemented to gather data regarding students' engagement in group cognitive, metacognitive and motivational and emotional learning activities. An open-ended interview containing questions about students' satisfaction and perceptions towards role design and assignment was also administered to students in the experimental condition.

3. Results

3.1. Interview Results

Two open-ended questions were devised to collect students' feedback towards process-oriented role design and assignment. Concerning the question "whether are you satisfied with the role design and assignment and why?" 13 positive and 9 negative reasons emerged from a total number of 40 responses collected from 40 students. Among the positive responses, the following four reasons appeared most: 1) role assignment makes specificity of each member's duties and a clear division of labor; 2) role division is reasonable for enacting group activities and each role is important for group collaboration; 3) roles fit with group members' ability and personal specialty; 4) being satisfied with no specific reasons. Among the negative reactions, the following four reasons appeared more than once: 1) roles should be assigned according to individual background; 2) roles should be assigned by group members; 3) roles do not function; 4) there lacks adequate clarity in duties across three roles.

Regarding the open-ended question "whether do you think role assignment is important for small group learning and why?" 21 positive and no negative responses were received from 40 students. The reasons for perceiving role assignment as important can be summarized as benefits for: collaborative tasks; learning achievements; motivation, affection and interpersonal relation; metacognitive processes. Among thereasons, the following 5 items appeared most: 1) role assignment is beneficial for performing and fulfilling group tasks; 2) clear and specific role duties are significant for promoting efficiency in group learning; 3) role assignment is significant for specifying personal duties; 4) assigning roles functioning in different aspects of group work is helpful for fulfillment of group task in an organized way; 5) role assignment contributes to a clear division of labor.

3.2. Questionnaire Data Analysis

Multivariate Analysis of Covariance (MANCOVA) was used to analyze the differences in group interactional processes between the experimental and the contrast condition. Students' engagement in group cognitive, metacognitive,

and motivational and emotional learning activities as self-rated in questionnaires were the dependent variables and the pre-test KSAs were selected as covariates.

The results indicate that means of all categories of learning activities in the experimental condition are higher than those in the control condition except the anxiety score.The pairwise comparisons of the estimated marginal means tell that the mean differences of three categories of learning activities, i.e., satisfaction, enjoyment and belongingness, between the two conditions were statistically significant. The results suggest that the intervention of assigning process-oriented roles to students in online group learning significantly enhanced group learning in terms of: a) converging in content level interaction to reach consistent solution; b) monitoring and adjustment of group task progress, strategies, and peer cooperation; c) the socio-emotional aspect of group interaction, i.e., students' satisfaction, enjoyment, and belongingness during small group learning.

3.3. Group Performance

To examine whether assigning process-oriented roles leads to differences in learning outcome, the concept maps produced in the experimental and the contrast condition were compared in terms of number of concepts, number of link words, and number of valid propositions. The results indicate no outcome difference in the maps from the two conditions.

4. Discussion and Conclusion

Using experimental design, this study found that assigning process-oriented roles to students in online group learning enhances students' group interaction in cognitive, metacognitive, and socio-emotional aspects. The findings complement the literature on instructional use of roles in small group learning. While prior studies reflected the deficiencies of instructional use of roles in facilitating group interaction in a systematic way, this study proposed to assign process-oriented roles to support three essential aspects of group processes: cognitive, metacognitive, and social emotional.

While motivation and emotion are an important dimension of students' group learning (Veldhuis-Diermanse, 2002), there is a lack of attention to this aspect in prior studies on groups learning. This study contributes to the literature in providing evidences to the pedagogical usefulness of assigning process-oriented roles in influencing group motivational and emotional aspect of interaction.

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