Exploring Self-Regulation in Group Contexts

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Abstract: Research on group processes that advances student learning has the potential to support current efforts aimed at introducing technological innovations into classrooms that encourage student collaboration. The current study focuses specifically on group processes that emerge during collaborative learning by exploring how groups use behavioral and cognitive regulation when working on collaborative tasks. Within our analyses, we examined evidence for group self-regulation among two 4-person groups of sixth grade students while they worked on three different group activities as part of a mathematics unit on statistics and graphing. Results suggest that groups made consistent efforts at regulating their learning and engagement, but that the overall quality of group regulation varied. In addition, our findings support the application of the general categories of behavioral and cognitive regulation to regulatory processes in groups, but suggest that specific aspects of self-regulation may be especially important in group contexts.

Introduction

As technological tools begin to promote student collaboration, it is important to look to the group process literature in considering how students learn in group settings. Educational research emphasizes the benefits of collaboration for learning because it provides students with the opportunity to question, share, and justify ideas (Cohen, 1994). However, many of the research questions concerning the specific group processes that contribute to advancing student learning remain unresolved (Cohen, 1994; Erkens, Prangsma, & Jaspers, 2006). One reason for this problem is that researchers have not carefully considered how learning processes may differ between individual and group settings. Research on self-regulated learning suggests that self-regulation can enhance learning in traditional classroom settings (Pintrich, 2000). It seems plausible that self-regulated learning would be beneficial in group contexts as well. For example, the inherent social nature of students working in groups makes it likely that off-task behavior will frequently occur. Moreover, the task of planning and monitoring the group's work may be especially important because it is critical that the group ensure that all students are benefiting from the group task.

Accordingly, the purpose of the current study is to investigate how small groups regulate their behavior and cognition. We use prior research on individual self-regulation as a guide to understanding group self-regulation, and thus distinguish between behavioral and cognitive regulation (Pintrich, 2000). More specifically, behavioral regulation refers to a student's efforts at sustaining his or her on-task behavior and persistence by attempting to eliminate distractions or using self-talk as a form of encouragement. Cognitive regulation consists of the processes of planning, monitoring, and evaluation. Planning refers to a student actively and consciously setting task-specific goals for learning, performance on the activity, and time use. Monitoring refers to a student's active evaluation of understanding or progress. Student monitoring of understanding refers to checking whether he or she understands the content being studied and the skills needed to engage in an activity. Students can also monitor their progress toward specific task requirements and time. Monitoring may influence a change in strategy or a revisiting of the task directions. Finally, effective self-regulators evaluate and reflect on their task performance once a problem or the task has been completed.

Method

The research reported here is part of a larger study investigating students' motivation and learning in small groups in mathematics (Linnenbrink, 2005). For the current research, two groups of sixth grade students (n=8) from the same classroom were videotaped while working in their small groups for three days across a mathematics unit (129 minutes for each group). Both groups were heterogonous with regard to prior math knowledge. Both Group A (Charles, David, Angela, and Rochelle) and Group B (Sam, Peter, Briana, and Julie) consisted of two males and two females (1).

Groups were observed working on three different tasks designed as part of a larger unit on statistics and graphing. This mathematics unit focused on teaching students how to read and interpret a variety of types of graphs

(e.g. bar graphs, line graphs, stem and leaf plots) and how to calculate basic statistics such as the mean, median, and mode. The 3 group activities were designed to include both lower (calculate the mean, median, mode) and higher-order questions (e.g., after calculating the mean, median, and mode for each graph, students were asked to write a paragraph describing which statistic best represented the data presented in the graph).

The data were analyzed using a qualitative approach, which allowed us to explore and describe the group self-regulatory processes that emerged. Narratives were prepared that thoroughly describe the group's interactions. Together, the two co-authors coded the narratives along a set of 8 dimensions (e.g. quality of group interactions, social comparison) (2). For the current study, we focus on the self-regulation dimension, but note the interplay with other dimensions when appropriate. We distinguished an individual's attempts to regulate his or her own learning and engagement from a group's attempts to regulate the group's learning and engagement. The latter, group self-regulation, is the focus of the current paper. Narratives were sub-coded for three aspects of group regulation: planning, monitoring, and behavioral engagement (3). Group interactions were characterized as *planning* when there was evidence of students discussing task directions, assigning group roles, and planning how to go about solving the problem(s). Group *monitoring* was coded when students were seen checking their work after completing a component of the task, or when monitoring progress or the time spent on the task. We did not code the narratives for evidence of *evaluation* because we did not observe the completion of the tasks. Group efforts at *behavioral engagement* were identified when students tried to encourage the group or an individual student to re-engage in the task. As a final phase of the analysis, the authors reviewed the codes and created summaries for each category for each of the narratives. The summaries provided an in-depth description of the types of group self-regulation that occurred in the group.

Results and Discussion

Behavioral regulation

Our analyses indicated that there were frequent attempts to behaviorally re-engage the group and that these attempts seemed to play an important role in the functioning of the group. The strategies used to behaviorally regulate the group included both low and high-level strategies. Groups frequently used brief, low-level attempts in order to get students back on task. For example, students used quick reminders such as, "Come on, we need to get back on task!" or "Hurry up!" in order to encourage re-engagement with the task. With respect to high-level behavioral regulation, we observed three patterns. One pattern was for students to encourage behavioral engagement by trying to involve group members in the task. For example, after realizing that Charles was disengaged, Rochelle suggests to Charles that he could help her write the summaries of the graphs. A second observed pattern was for group members to support a feeling of group cohesion or sense of team. For example, Briana encouraged persistence saying "Come on, if we work hard we can get this done," suggesting "let's get this done" together. In a third pattern, students used between-group comparison by turning to other groups and comparing their group's progress as a way to encourage persistence and engagement. For example, Briana compared their speed to other groups by suggesting, "Okay we have to get back to work. Everybody else is ahead of us." There were some drawbacks to trying to sustain progress and engagement, however. Thoughtful task related questions and attempts at monitoring understanding were sometimes thwarted by group members' concerns about time and maintaining engagement. For example, while Peter and Briana were selecting data for the line graph, Peter asked a thoughtful question about how to make a line graph using the selected data. Rather than responding to the question, Briana interrupted him in the interest of continuing to make progress on the task. In this manner, behavioral engagement sometimes served to focus the group on completion rather than on attempts at deepening understanding. Overall, the high-level strategies used to behaviorally engage the group may have been more effective because these collaborative attempts seemed to sustain on-task involvement.

Cognitive regulation

Planning. Many of the patterns observed for group planning were similar to those proposed by the literature on individual self-regulation. The group context, however, afforded a unique window into the *process* of planning. For example, group members worked together at the beginning of an activity to interpret and clarify the presented task directions. By interpreting the task directions together, Briana and Peter were able to recognize that they had misinterpreted the directions. In addition, students in the group also planned how to go about solving the task. Here, the group discussed the order in which to progress, planned their next steps, or assigned group roles. Groups also demonstrated evidence of more advanced planning within the group. For example, when planning to draw the next graph, groups discussed the type of graph which would best represent a set of data. In an interesting pattern, we also

observed interplay between monitoring and planning, such that students revised their plans for working on the task when their monitoring indicated a problem. For instance, when checking whether their group had done the task correctly, Group B realized that they had drawn the wrong graph and that they needed to alter their plan. The relation between monitoring and planning seemed more advanced because students revised and adapted their plans in response to monitoring and task feedback.

Monitoring. As with behavioral engagement, there were varying patterns of monitoring observed. Less effective monitoring included superficial forms of monitoring that did not serve to deepen understanding. For example, group members would simply take over a fellow student's work without taking the time to explain their corrections and provide feedback. There were also attempts at group monitoring that were tempered with a negative tone or signs of disrespect. Students were observed grabbing other students work, taunting their group members, and voicing put-downs of a student for incorrect responses. For example, Angela explicitly told her group that they would need to check over David's work "because it is probably all wrong." In this way, less effective forms of monitoring seemed to occur during negative group interactions.

We also observed more effective attempts at monitoring. First, effective monitoring involved the collaboration of the whole group in monitoring their progress, rather than one group member taking the responsibility. Group members were observed leaning in and working together to check the group's work on the task. For instance, Group B questioned the mean that they had calculated because it ended in a repeating decimal. As a result, they spent 10 minutes re-working their calculations using the provided calculator, re-calculating the mean by hand, and explaining why they continued to get the same repeating decimal. This example highlights that some collaborative efforts at monitoring understanding were prolonged. In addition, this instance revealed an interesting role of technology. The group seemed to question the accuracy of the calculator and wanted to ensure that they would receive the same answer when calculating the findings by hand. As such, the use of technology in this group seemed to encourage monitoring, as students questioned their findings. While this may seem counterintuitive in that many students assume that a calculator or computer "can't be wrong," our findings are encouraging in that the technology seemed to encourage rather than discourage group regulation. A second pattern of effective monitoring was seen when group members provided informational feedback in response to incorrect answers and then worked together to incorporate the suggested changes. For instance, Briana checked Peter's work, made suggestions about how to clarify the bar graph, and then they both worked on incorporating her feedback. Finally, we also observed that between-group social comparison contributed to effective monitoring. Group B used social comparison as a source of feedback regarding their task progress. For example, Briana noticed that they had finished the task before other groups, saying, "Are we doing something wrong…then why are we the first ones done?" This prompted Peter to turn and deliberately monitor the work of other teams to check if there was a section of the task that they had not yet completed. While there were instances when groups engaged in between-group social comparison that did not serve an informational purpose (e.g. competing with other groups), this example indicates that social comparison may serve a regulatory purpose in that it led the group to revisit the directions and check their work.

Overall, our results indicate that the two groups made consistent efforts at regulating their group's engagement and learning, demonstrating a high quantity of group regulation. While these attempts at group self-regulation were frequent, the overall quality of group regulation varied, with instances of high quality planning, monitoring for understanding, and behavioral engagement occurring less frequently. In addition, our findings suggest that the general categories of behavioral and cognitive engagement that were developed for understanding individual self-regulation can be applied to interpret regulatory processes in groups. Different aspects of self-regulation, however, appear to be especially salient in group contexts. For example, efforts at behavioral engagement were recurring and played an important role in group functioning, most likely because off-task behavior is common in group contexts. Given the descriptive nature of the current study and the small sample, it will be important for future research to confirm these patterns and to consider how group regulatory processes relate to other aspects of group functioning. As technology becomes integrated into collaborative learning, future research should also investigate whether these same group regulatory processes can be applied to technologically-rich collaborative contexts.

Endnotes

(1) Please note that all students' names are pseudonyms.
(2) We are not able to calculate an inter-rater reliability score because all narratives were coded together. Any discrepancies were resolved through discussion.
(3) Additional details regarding these codes and the process of coding are available from the authors.

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