Emergent Leadership and Its Influence on Collaborative and Individual Reasoning

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Abstract: Collaborative discussions that feature argumentation have been shown to benefit children's reasoning skills and provide an optimal environment for children to strengthen their social skills including emergent leadership. As these social skills develop, it is unclear how they impact the cognitive benefits that children yield from participating in the collaborative discussions. This study examined the immediate and delayed impact of children's emergent leadership on their reasoning at both the group and individual level. Results showed that among different leadership moves that emerged during collaborative discussions, topic control significantly influences whether the discussion group and individual children consider both sides of a controversial issue. The study implies positive influence of emergent leadership on children's cognitive development during collaborative discussions.

Introduction

Collaborative learning is widely recognized as an instructional format that promotes socialization and learning among students of different levels in a variety of subjects (Mercer & Littleton, 2007). Research has shown that, when compared to direct instruction, peer-led collaborative discussions that foster argumentative dialogue can lead to children's better comprehension of the text, development of critical and analytic thinking, and improved argumentation skills which further transfer to their writing (Rezniskaya et al., 2009).

Argumentative dialogue is a type of classroom discourse that can shape how learners reason about a topic. Based on the Vygotskian principal of internalization, argumentation has been used as a framework to promote higher-level reasoning and critical thinking skills (Andriessen, 2006). It is believed that, during argumentative dialogue, students first learn to reason out loud with their peers and then internalize the process. When children reason together, they hear a variety of different and sometimes competing voices and opinions. In the process of internalization, children learn to consider multiple perspectives on an issue by comparing and contrasting different, and often opposing, views that they are exposed to during the group discussion (Morris et al., in press).

The social processes during collaborative discussions have been found to be an important component for productive collaboration in both face-to-face and online settings (Cassell, Huffaker, Tversky, & Ferriman, 2006; Li et al., 2007; Sun et al, 2017b). To ensure smooth social processes within each group, children's communicative dynamics and effective co-regulation of learning become essential. Research has shown that emergent leadership—a dynamic social process during which some children coordinate, enhance, or guide the behavior of others—can help groups feel more positive towards collaboration and produce better solutions (Mercier, Higgins, & Costa, 2014; Miller et al., 2013; Sun et al., 2017a; Yamaguchi & Maehr, 2004). Sun and colleagues (2017a) found that after experiencing a series of collaborative discussions, children developed generalizable social skills in leadership, and effectively applied them in cooperative problem-solving activities that helped produce better problem solutions. Similarly, Ma et al. (2016) examined rotating leadership among students in an online forum and found that more than half of the participant students emerged as leaders, and deepened groups' understanding of the scientific topics.

While there is ample qualitative and experimental evidence to suggest that peer-led collaborative discussions that feature dialogic argumentation can lead to gains in reasoning (Asterhan & Schwarz, 2017), less is known about whether the emergence of leadership can directly impact the uptake of ideas and presenting of diverse perspectives in collaborative dialogue. Little do we know about whether these social processes have downstream effects on how participants reason about a topic post-discussion.

The study therefore aims to disentangle such complicated processes and advance knowledge about how the emergence of leadership during collaborative discussions influence children's dialogic and written argumentation about a complex policy issue. Specifically, we ask two research questions: 1) Does emergent leadership influence the quality of dialogic argumentation at the group level? 2) Does emergent leadership impact individual child's written argumentation after the collaborative discussion?

Method

Participants

255 fifth graders from 12 fifth-grade classrooms from the Midwestern US of mainly African American (41.5%) and Latino (45.7%) children took part in this study. Depending on the school, between 79% and 99% of the participating students were registered for free or reduced-price lunch.

Research design

During the intervention, the participant classrooms studied a six-week curriculum about Wolf Reintroduction and Management in collaborative group work. The curriculum included three packets: (1) the wolves' potential impact on the town's surrounding ecosystem and (2) the town's economy, and (3) basic concepts in relation to how a public policy is enacted. Each packet was comprised of readings specific to the topic, and an activity booklet that contained various activities and problems that reinforced and expanded the concepts presented in the readings. Students role played as officials in the Wolf Management Agency while learning the curriculum, and had to make an informed decision on a Big Question about whether they should give permission to hire professional hunters to kill a pack of wolves that posed a threat to a fictional town.

The study employed a jigsaw design. Teachers helped split their classes into three or four heterogeneous groups, where each group was assigned to become experts on one of the three topics (ecosystem, economy, or public policy) by learning from an information booklet and completing the activities together. After finishing their expert topic, they prepared a poster and presented the core concepts to the other groups. Children were then shuffled into new groups of experts from all three topics to hold a final collaborative discussion about the Big Question with their informed perspectives. Each student was asked to write a letter explaining the decision after the discussion.

Data sources and analyses

The data corpus includes full transcripts of 12 groups' final collaborative discussions, one randomly-selected group from each participant class, and 75 letters written by students from these 12 groups after the discussion.

Coding for children's leadership

Using the coding scheme created by Li and colleagues (2007), we identified four major categories of emergent leadership moves by examining speaking turn by turn throughout the transcripts: turn management, argument development, planning and organizing, and topic control. The detailed coding scheme and examples can be found in Table 1. About 20% of the leadership coding was checked separately, and the inter-rater agreement percentage was 90% (Cohen's Kappa = .79).

Table 1: Leadership Coding Scheme Adapted from Li et al., 2017.

Category	Definition	Example
Turn Management	Direct turns, solicit ideas, ask those who interrupt to let someone else talk, yield a turn to someone who was unable to gain the floor.	What do you think? Did you want to say anything?
Argument Development	Prompt for reasons, evidence, and clarification from others, or ratifying other's arguments by restating them or making comments.	Why? Where did you find that evidence?
Planning & Organizing	Provide structure and monitor the group's processes.	Let's take a vote!
Topic Control	Encourage peers to look at another side of a topic, or go back to the original topic.	I think we are off topic. Should we think about the no side?

Coding for structure of group-level reasoning

To decompose the structures of students' reasoning during the collaborative discussions, each speaking turn was coded for elements of argumentation, based on the coding scheme created by Anderson and colleagues (2011). We identified statements of position, reasons in support of a position, considerations of counterarguments, and rebuttals. The inter-rater reliability was 94% (Cohen's $\kappa = .89$).

Coding for structure of individual-level reasoning

To examine the structure of individual-level reasoning in the wolf decision letters, each letter was segmented into communication units (Crooks, 1990), and then coded for statements with positions, counterarguments, and rebuttals (Reznitskaya et al., 2009). The inter-rater reliability was 98% (Cohen's $\kappa = .92$).

Findings

Overall, there were 2,789 speaking turns from the 12 transcripts, of which 221 turns contained at least one type of leadership move. A substantial number (72%) of the leadership moves were "argument development" where students solicited reasons from peers, prompted for clarifications/evidence, challenged with refutation or counterargument, or supported with ratification. Though the distribution of leadership varied across groups, three out of the four leadership moves occurred in every discussion. The fourth one, "topic control," only appeared in four discussion groups. Though appearing less frequently, the topic control moves exerted a significantly positive impact on the comprehensiveness of collaborative and individual reasoning.

Immediate impact of leadership on collaborative reasoning

The immediate impact of emergent leadership on group-level reasoning was examined by coding the group's responses to the attempted leading moves. For example, if a child challenged his or her peer with a disagreement, did the peer respond with a counterargument?

Children often used the topic control leadership move to call the group's attention to look at the other side of the issue. For example, in one discussion group where students expressed opposite positions at the beginning of their discussions, a student named Shawn used this strategy to prompt the group to consider reasons for "should." Later, after the group shared sufficient reasons about the "should" side, Shawn called the group's attention again to consider reasons why they should not hire hunters to kill the wolves. His leadership evidently facilitated the group to consider reasons on both sides.

Shawn	**Let's go to reason why they sho-should allow [1] right now. [1]**
Alice	[1] Yea, we should start with why they should allow.
Shawn	Ok. Maybe they should because just like a possibility of the wolves, like, getting into Winona and umm getting into their cities, maybe attacking people.

Not every group used the topic control moves in the same manner. In another group where all children held the same position from the beginning, one student decided to ask the group to consider the opposite side after they spent a significant amount of time looking for reasons to validate their opinions on the one side. Without Karen's leadership move, the group may reach a biased conclusion without examining the negative impact of wolves on the town's economy.

Karen	**Ok. Look we already know that we want the wolves to stay, but now we gotta think about the things that the wolves actually hurt.**
Jay	Money.
Karen	How do they hurt money?

Delayed impact of leadership on individual reasoning

Using counterargument and rebuttal

There was also a notable impact of the topic control leadership move on the argument structures of children's individual essays. An average of 70% of children considered the yes and no sides of the issue if their discussion groups had used the topic control leadership moves. However, for groups that contained no topic control or very few argument development leadership moves, an average of 30% of children wrote an essay that addressed both sides. Below is an excerpt from one essay written by a student whose group discussion contained topic control leadership moves. In the essay, she addressed the town people's fear of wolves by not only showing evidence from the Wolf Unit text, but also providing a plausible counterargument that followed by a rebuttal.

> *I think we should not kill the wolves. / One of the main reasons is because wolves or a healthy wolf has no record of hurting or killing a human. /* ***I understand you are scared that a wolf might hurt your child. / But you haven't seen a wolf in the town. / All of those attacks could have been wild dogs. /***

Discussion

Early results from the present study suggest the positive impact of emergent leadership on children's collaborative and individual reasoning. It is intriguing that the topic control moves during discussions are so

highly influential on children's reasoning, at both the group- and individual-level. Consistent with findings from Li et al. (2007), it appears that the emergent leadership during collaborative discussions encouraged much more student talk and this talk was, on average, of a high quality with students making efforts to explain themselves as well as providing challenges to one another.

Results from this current study echoes Kolikant and Pollack (2015) study which found that when adolescents held opposing views, the discussion was more energized and enriched. Similarly, Hemberger et al. (2017) argued that it was through the continuing experience of arguing with peers who held contrasting positions that the structure of a good argument becomes crystalized. Our study adds to the literature by showing that even when students initially had unanimous ideas, if someone in the group employed the leadership moves to draw attention to the opposing views, they would be much more likely to produce more comprehensive reasoning and internalize the structure of a good argument.

As a whole, this study contributes to the field by examining the interplay between children's social and cognitive development. It advances the understanding on the social interactions that contribute to productive collaborate discussions and better reasoning about complex policy issues.

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