

Collaborative and Emergent Regulation of Open-Ended Inquiry Through Semiotically Mediated Structures

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Abstract: Regulation of open-ended collaborative inquiry is an emergent, collective process. The study explores emergent regulation of knowledge building in a class of fourth graders inquiring light. The analysis traces knowledge building discourse and semiotic artifacts that enable a heterochronic link between actions occurred on different timescales.

Introduction

Effective collaborative knowledge building depends on student collective responsibility to jointly guide and control the trajectory of their work as it unfolds and deepens over time (Scardamalia, 2002). A challenging aspect is to understand how shared regulation can be maintained in minimally scripted environments and over extended periods of time, two features that typically characterize learning in open-ended collective inquiry and knowledge building (Zhang et al., 2018). Drawing on the theory of collaborative emergence (Sawyer, 2012) and on the notion of heterochrony (Lemke, 2000), regulation of collaborative inquiry can be explained as a collective bottom-up phenomenon whereby momentary actions of the participants grow, across interactional episodes, into intermediate collective structures, which have the potential to guide and delimit the inquiry trajectory. The moment-to-moment interaction is contingent not only on preceding circumstances but also on meanings of actions occurred in the past and that are recalled through the mediation of semiotic objects such as artifacts, individuals, etc. The purpose of this study is to examine critical moments of social emergence of a shared epistemic focus and determine how they add up to intermediate shared structures that frame and orient the ongoing inquiry work.

Method

The present study analyzes a group of 4th grade students participating in knowledge building on optical phenomena supported by Knowledge Forum (Scardamalia, 2002). It concentrates on the first two episodes of their three-month activity. Using an ethnographic perspective on discourse analysis, we analyzed a set of data including classroom interactions, teacher's reflection journal and online artifacts.

Findings

The data analysis focused on understanding the critical moments of social emergence of a shared focus on light, which guided the unfolding of the inquiry. A classroom discussion marked the beginning of the collective study, during which the initial topic "light" progressively evolved to investigate issues related to phenomena of reflection, absorption of light and colors on different types of surfaces. In this initial episode, the teacher showed notes the students wrote in a former view of Knowledge Forum (KF) when they were in Grade 1. One of these notes, in particular, contained a theory about how animals' fur color adapts to light. What follows is the teacher's journal note on this episode:

"...We looked at the "Adaptive Weirdos" view in the old Grade 1 database created by the current Grade four students. (...). The last note we opened (...) contained a theory about grey fur "reflecting" light away from his creatures' eyes so that it can see better. This note generated an interesting discussion on how light responds to color. (...). It also happened to be snowing outside after a few weeks of very mild spring weather. The discussion progressed to snow and the color white. We asked the question if there was a reason why snow was white. The students had many theories to share (...)."

In this initial episode, two critical moments of social emergence influenced the direction of the collective focus. The first one is when looking together at an old note in KF triggered a discussion about response of light to colors. Students started to develop and share initial theories about reflection and absorption of light on black surfaces. The second one is contingent on the snowing event outside, which unexpectedly stimulated an interest in observing how snow responds to light and redirected the attention to the connections between light, snow and color white. This emergent, collective focus became an intermediate structure that framed the subsequent inquiry activity. This structure is embedded in the new view called "Grey Fur and White Snow" that the teacher created

in KF. The view included portions of the original Grade 1 note that prompted students' discussion on light and colors.

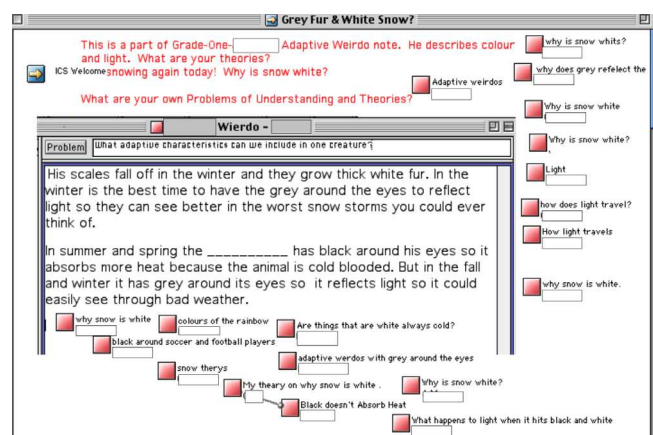


Figure 1. Knowledge Forum view called “Grey Fur and White Snow”.

The day after, the teacher was informed by Grade 1 teacher that during his absence students worked with great excitement in the new KF view. They seemed to “reconnect” with their former teacher as they shared with her their new problems of understanding and recalled experiments they performed with her in Grade 1. The following quote from a student was recorded in the teacher’s journal:

“I think snow is white because if the snow was black then it would melt faster. Since the snow is white, it is colder. At the courtyard center in Grade 1, we did an experiment where we put snow on black paper and on white paper, the black paper's snow melted faster”.

On this second day, students’ epistemic focus deepened towards a better understanding of light and color by comparing white and black and by including the notion of heat. Progression in the topic was associated with two socially emergent moments: Students became involved with the newly created view in KF and shared their new problems of understanding with their former teacher, recalling experiments done in Grade 1. The way the topic develops at the shorter timescale of these two episodes is an example of collaborative emergence (Sawyer, 2012). It is not scripted by the teacher nor can be predicted in advance. It is characterized by moment-to-moment contingency on concomitant events. Yet, if we take a longer timescale perspective, we start to see that the emergent unfolding of a shared epistemic focus is influenced by objects and events belonging to the past and creating a heterochronic link between the ongoing activity and a longer timescale process. Students and teachers interacted not only with each other in the here-and-now situation but also with semiotic elements – old KF notes, Grade 1 teacher, snowing outside – which triggered memories of actions occurred long time before and whose meanings became relevant to the emergence of a shared inquiry focus. These symbolic objects constrained subsequent actions and sustained a deepening focus.

This study suggests that shared regulation is a process emerging from the spontaneous flow of group interaction but with symbol-mediated linkages running on a longer timescale. Future work needs to examine emergent patterns of organizing the inquiry work through longer strands of classroom episodes.

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