



Reframing Classroom Discourse through the Lens of Benefit to Cost Ratios

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Abstract

Publications to advance science education in numerous countries, including national curricular documents, emphasize the importance of dialogic science learning environments. Yet dialogic interactions rest on the assumption that students will demonstrate agency -choosing to actively participate and drive interaction for learning in classroom activities. Sociocultural theory is commonly used to inform research and practice in dialogic science classrooms. In this paper, we argue that benefit in relation to cost (benefit to cost ratio) offers a parsimonious and user-friendly alternative for informing research and practice. Drawing upon empirical studies, we examine student agency in relation to cooperation, talk, and science. First, we report on parallel regression studies of primary and tertiary level students that explored classroom factors driving students' willingness to cooperate with one another. At both age levels, students' valuation of their peers was the key factor influencing their cooperation (Std $\beta = .31$ - primary level, Std $\beta = .59$ - tertiary level). This as well as other influential factors (social concern, reciprocity) appear to point toward the construct of benefit in relation to cost. We then relate benefit to cost ratio to science teaching with the Science Writing Heuristic approach (SWH). The SWH emphasizes using science as a toolkit by engaging students in asking science questions, making observations and subsequently negotiating evidence-based claims with their peers. As students engage in these tasks they are continuously negotiating ideas publicly using various forms of language and grouping levels (small group, whole class) and privately as they have time to personally reflect after interacting with other students. We briefly outline how benefit to cost ratios underlie key principles of the SWH and summarize the impacts of the SWH on classroom discourse.

Keywords: Classroom discourse, Science education, Agency, Cooperation, Motivation, Active Learning;