

# Constraints and affordances for the implementation of dialogic argumentation in science classrooms

Thesis for the Degree of  
Doctor of Philosophy

by

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Submitted to the Scientific Council of the  
Weizmann Institute of Science  
Rehovot, Israel

**2022**

## **Summary**

The last decades have witnessed a growth of research demonstrating the efficacy of dialogic argumentation in supporting student learning in science. Following such documented potentialities, a call for the implementation of argumentation in science classrooms has been advanced in local and global reform-minded documents. However, we continue to find substantial evidence that teachers rarely allow for the incoming of dialogic pedagogy into their classrooms, and instead maintain the incumbent pedagogy of teacher-centered instruction. In two distinct and complementary empirical studies, this dissertation set out to investigate why it is so

difficult - and what would it take - to dislodge the dominant teacher-centered pedagogy and modes of interaction for the incoming of dialogic argumentation. I attend to this puzzle by drawing on insights and concepts derived from the field of sociology of organizations, which is concerned with the systematic study of organizations as situated within broader social institutions that shape their practices, expectations, and norms.

The first empirical study (in Chapter 2) focuses on implementation constraints. It seeks to understand why dialogic argumentation has not been adopted as a legitimate means of instruction by science teachers. To answer this question, this qualitative case study looks inside schools and science classrooms to examine the mutually constitutive relationships between macro-level phenomena, such as the taken-for-granted institutional mandates that teachers and schools call upon to maintain their legitimacy in society, and micro-level routinized teacher–student classroom interactions. Integrating ethnography with the analysis of classroom interactions, I seek to capture the social structuring that informs instruction and classroom interactions. Based on an inductive analysis of observations, interviews with teachers, and documents, three types of macro-level institutional logics that mediate against the implementation of dialogic argumentation emerged. These included the logics of (a) accountability, (b) tracking, and (c) the profession. These logics give rise to instructional practices that run counter to the pursuit of dialogic argumentation. Classroom observations were analyzed to examine how these logics are conveyed through institutionally bounded interactions between teachers and students. Shaped by these institutional logics, instruction in classrooms is narrowed to mostly direct instruction of terminology and absolute facts, and is stratified into various status levels according to classroom tracking. I argue that teachers may resist dialogic argumentation primarily because it violates the fundamental rules, norms, and practices that grant them individual and organizational legitimacy. This contextualization of teacher–student interactions as motivated by institutional logics may explain in greater detail the absence of dialogic argumentation from science classrooms.

The second empirical study (in Chapter 3) focuses on implementation affordances. Recognizing that instructional practices that can be perceived by teachers as potentially threatening appropriate organizational conduct may encounter resistance, an extracurricular environment was established to: (a) afford

teachers opportunities to experiment with dialogic argumentation while being liberated from some of the constraints of schooling, and (b) find ways to carry out this practice in ways that are broadly consistent with the elements deemed valuable inside schools, thereby, potentially improving the chances of its adoption by teachers. This study focuses on socioscientific argumentation, with which students' engagement is required in order to meet the challenges of the modern world. Classroom interactions emerging from this pedagogy may be at odds with how schools and teachers are accustomed to defining quality learning, thus creating tension and potentially undermining implementation. The literature suggests that argumentative talk that diverges from scientific knowledge and rationalistic patterns of reasoning toward subjective claims, as well as instances of unproductive argumentation, are at the root of these tensions. Enactments of teacher-led and peer-led socioscientific argumentation in an extracurricular environment were examined using two analytical frameworks related to the content and form, respectively, of the students' arguments.

I explore, qualitatively, how enactments of socioscientific argumentation in this environment could be more harmonious and more easily integrated with contemporary schooling practices. The findings show that in teacher-led argumentation, the students relied on science knowledge more prominently when teachers extended their elicitation of responses with follow-up interrogative questioning. In peer-led argumentation, talk tended to collapse into confrontational disagreement or uncritical agreement, obscuring instances in which students relied on science knowledge. To expand from the extracurricular environment more permanently into schools, I discuss the significance of teachers' use of productive talk moves toward integrating socioscientific argumentation as a core instructional practice.

A unified discussion (in Chapter 4) seeks accumulateness and integration among the findings from both studies to formulate an institutionally sensitive response that could potentially advance the implementation of dialogic argumentation. This response accounts for the perceived legitimacy of dialogic argumentation, for the knowledge and competency needed from teachers to carry dialogic activities in productive ways, and for the interactional mechanisms that can sustainably mediate instruction in science classrooms towards dialogic argumentation and away teacher-centered pedagogy.