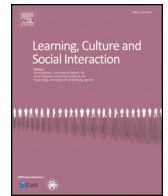


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Complementary lenses: Using theories of situativity and complexity to understand collaborative learning as systems-level social activity

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ABSTRACT

This article highlights possibilities for understanding challenges related to collaborative learning by bringing two complementary lenses into theoretical and empirical conversation—complexity and situativity. After presenting a theoretical comparison that characterizes complementarity between complexity and situativity in order to frame their relative contributions to a systems-level understanding of learning processes, we examine persistently unproductive social activity during a 14-session, collaborative engineering design project in a fifth-grade peer group from both perspectives. We do so in order to demonstrate the value of these complementary perspectives for understanding collaborative learning processes and to suggest different explanations of why unproductive social activity sometimes persists and possibilities for interrupting such dynamics. We thus suggest a shift from explanatory accounts of system processes to prospective processes for systems of action within social ecologies of change. Such a framework can resolve the social activity of collaborative learning around a systems-level orientation.

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1. Introduction

Scholars draw from a wide range of perspectives to examine learning as a form of social activity. In this article, we highlight two theoretical perspectives that consider social activity in terms of systems—complex adaptive systems theory (hereafter complexity—e.g. [Arrow, McGrath, & Berdahl, 2000](#)) and situated cognition, or situative perspectives (hereafter situativity—e.g. [Greeno, 1989](#)). We enlist these particular systems-level perspectives to develop a theoretical and analytical conversation among researchers interested in understanding and examining learning as a systems-level social activity. The goal of developing such dialogue echoes earlier commentary about the value of synthesizing synergistic perspectives (e.g., [Greeno & MSMTAPG, 1998](#)). Specifically, complementary understandings between complexity and situativity can resolve systems of social activity such as collaborative learning in ways that characterize learning processes as more than the sum of individual learners. The analytical illustrations we present below seek a synergistic confluence between situativity and complexity theories in order to contribute to a dialogue stemming back to the 1990s ([Greeno & MSMTAPG, 1998](#)) and continuing into the 2000s ([Lemke & Sabelli, 2008](#); [Sawyer, 2003](#)) about the epistemic reflexivity that synergistic theoretical intuitions such as these can offer.

We organize this article into four parts. First, an illustrative episode introduces a perplexing case of collaborative learning through which we advance a theoretical and analytical conversation. This case entails one peer group's persistently unproductive social activity during a 14-session, collaborative engineering design project in a fifth-grade classroom. Second, we present a

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theoretical comparison that characterizes complementarity between complexity and situativity in order to frame their relative contributions to a systems-level understanding of learning processes. Third, we develop analytical illustrations of our case study that extend from prior research (Anderson, 2009; Jordan & Babrow, 2013; Jordan & McDaniel, 2014) in order to demonstrate the value of complementary perspectives for understanding learning processes. Finally, we offer theoretical, methodological, and practical discussion of what such theoretical and analytical complementarity affords.

2. Grounding the conversation in the challenges of collaborating, learning, and collaborative learning

In order to ground our conversation of situativity and complexity, we first introduce our focal case of collaborative learning. Fostering and sustaining collaborative learning in classrooms and beyond present well-documented rewards as well as persistent challenges (e.g., Arvaja, Salovaara, Häkkinen, & Järvelä, 2007; Anderson & Weninger, 2012; Mercer & Howe, 2012; Rojas-Drummond, Torreblanca, Pedraza, Vélez, & Guzmán, 2013). With respect to our case, designing for collaborative learning through problem- and project-based approaches does not always lead to productive disciplinary engagement (e.g., Anderson & Zuiker, 2010; Azmitia, 1996; Barron, 2003); tensions inevitably emerge, for better and sometimes worse. Learners often either get things done (i.e., collaborate) or find things out (i.e., learn), but not necessarily simultaneously. Attempting to regularly accomplish one in terms of the other reflects enduring tensions when considering collaborative learning (e.g., Kuhn, 2015; Schauble, Glaser, Duschl, Schulze, & John, 1995). These enduring tensions can be productive, particularly if they can be better understood in real-time as well as over time, underscoring the value of expanding discussion across theoretical perspectives and grounding our present empirical consideration of complementarity between situativity and complexity.

We develop our argument through illustrative analyses of an episode from a case of collaborative learning—one peer group of fifth-graders who participated in an engineering design project developed and enacted by their teacher, Ms. Z. The case derives from a larger, ethnographic study in which Michelle Jordan (third author) explored disciplinary engagement and collaborative learning across multiple engineering projects in a suburban fifth-grade classroom in the southern U.S. (Jordan & Babrow, 2013; Jordan & McDaniel, 2014). Specifically, the original study aimed to understand how fifth-grade students managed communication challenges during collaborative, creative problem-solving. Ms. Z designed collaborative projects across content areas throughout the school year, reiterating similar expectations for productive group interactions such as division of labor according to group-assigned roles, the importance of respecting everyone's contributions and taking responsibility for productive communication. Students in Ms. Z's class, therefore, grew familiar with collaborative group work and their teacher's expectation thereof.

The case we consider here took place during the final of three design projects—a unit in which each of the six teacher-assigned peer groups identified a unique environmental problem and designed a robot to address it. Groups then built, programmed, tested, and revised their designs through multiple iterations using Lego Mindstorms materials, working 40–120 minutes per day across 14 instructional sessions (20 hours total). These sessions featured planned curricular resources (e.g., design product specification sheets), social and task resources (e.g., instruction in new programming techniques, expectations for brainstorming activity, explanation of the role of critique in engineering design), and recurring whole-class participation structures (e.g., public peer critique sessions). Importantly, the dynamics of this focal peer group unfolded against a broader backdrop of generally productive, class-wide social activity that supported and sustained collaborative learning, including emergent practices developed by students and the teacher, respectively.

In our analyses below, we characterize a project-long trajectory in which members of this focal student group and Ms. Z repeatedly attempted to remediate what they jointly oriented to as unproductive group-level social activity. To explore the nature of this unproductive social activity, we draw interactional evidence from episodes in which conflict ensued, in part, around a “leader role” that Ms. Z suggested to help groups organize their materials. However, while the leader role presented one manifestation of dysfunction for this group, it alone fails to resolve why unproductive social activity persisted across the 4 weeks of their partnership, despite their collective desire to create a successful product in a classroom that presumably reconciled numerous other, and possibly similar, sources of potential friction among all of the groups across all three projects. The following two excerpts are taken from the thirteenth and penultimate project sessions and illustrate a critical incident and its aftermath in which Ms. Z temporarily removed one group member, Derrick, which we see as the apex of group dysfunction. As the excerpt begins, Ms. Z asked the group to “talk to Derrick about [their] experience yesterday” and how each perceived group problems.¹

2.1. Excerpt 1a: Teacher intervention, Session 13, part 1

Bobby: Yesterday you kinda acted bossy and acted like, like—yesterday you told us there weren't any pieces and then//
 Derrick: //But I didn't//
 Ms. Z: //Wait a minute, we're going to go all around and then you can talk. Thank you, Derrick.
 Ida: You were going around to other groups, talking to Bill and things like that.

¹ All names are pseudonyms.

Transcription conventions:

// latched (closely overlapping) speech

— self interruption, turn at talk ending on slightly upward intonation

... lines of talk omitted for brevity (not crucial to focal interactions)

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