Productive Disciplinary Engagement: Examining Negotiation of Group Activity with Multiple Frameworks

Debra Gilbuena, Oregon State University, Corvallis, OR, gilbuend@onid.oregonstate.edu,
Marja-Liisa Makela, Centre for Learning Research, University of Turku, Turku, Finland, mllmak@utu.fi
Tuike Iiskala, Centre for Learning Research, University of Turku, Turku, Finland, tuiiska@utu.fi
Simone Volet, Murdoch Univeristy, Perth, Australia, S.Volet@murdoch.edu.au
Susan Nolen, University of Washington, Seattle, WA, sunolen@u.washington.edu
Milo Koretsky, Oregon State University, Corvallis, OR, milo.koretsky@oregonstate.edu
Marja Vauras, Centre for Learning Research, University of Turku, Turku, Finland, vauras@utu.fi

Abstract: Productive engagement in meaningful activity is essential for learning and becoming in practice. However, learning systems that support such engagement are complex and usually studied in single contexts making findings difficult to transfer. We detail research among four universities who study these systems in different contexts. We illustrate how each university examines the negotiation of group activity and how their different frameworks and methodological approaches overlap, are complementary, and can be integrated.

Introduction

Productive engagement in meaningful activity is essential for motivation and progress toward flexible, adaptive expertise in science, technology, engineering and mathematics (STEM). However, learning systems that support engagement in this way are complex and difficult to scale. Such systems are usually studied and designed in single contexts, so the knowledge gained is difficult to transfer to new settings. We report on joint research among universities from Australia (U1), Finland (U2), and the US (U3 and U4) who study these systems. We aim to identify unifying themes and develop generalizable understandings about supporting *productive disciplinary engagement* (Engle & Conant, 2002) in STEM and capture the kind of interaction likely to result in deep learning of concepts and incorporation of practices. We focus on group settings in authentic contexts, where students must integrate and flexibly apply those concepts and practices. Using a single data set, we compare two frameworks: (1) metacognitive regulation (MR) and (2) negotiating a joint enterprise in "figured worlds." We examine how students engage and interact with one another as they work in groups.

Negotiation of Group Activity in Productive Disciplinary Engagement

Engagement has been defined generally as "active, goal-directed, flexible, constructive, persistent, focused interactions with the social and physical environments" (Furrer & Skinner, 2003, p. 149). Engagement is productive when conceptual or practical progress on a problem is made over time and is disciplinary when students use the discourse and practices of a discipline in their work together. We operationalize productive disciplinary engagement as learners using the discourses and practices of the discipline in the projects to "get somewhere" (develop a product, gain better understanding) over time.

Framework 1: Metacognitive Regulation (MR)

U1 and U2 use this framework with different methodological approaches; U1 applies co-regulation and U2 applies socially shared metacognitive regulation (SSMR). Both share theoretical assumptions of MR (Volet, Vauras, Khosa, & Iiskala 2013) focusing on how students of a group jointly regulate their cognitive processes to progress towards shared goals. The core idea is to understand MR and communication as students work together in student-led, challenging and collaborative learning systems. A group is a social system of multiple regulating participants with both group and individual levels, making it necessary to consider self- and social regulatory processes as integrated. The first approach, co-regulation, combines the constructs of social regulation and content processing as two dimensions of socially-regulated learning (Volet, Summers, & Thurman,2009). Social regulation occurs on a continuum from the individual level to the preferred group level, labeled co-regulation. Content processing occurs on a spectrum from low to high level. Two orientations of cognitive engagement have been identified: task co-production and knowledge co-construction (Volet et al., 2013). We use these categories to examine the flow of group activity from the viewpoint of MR. The second approach is referred to as SSMR, which refers to the students' goal-directed consensual, egalitarian and complementary monitoring and regulation of joint cognitive processes in collaborative learning (Iiskala, Vauras, Lehtinen, & Salonen, 2011). This approach was utilized reliably to identify different foci and functions of SSMR (Iiskala et al., 2011). The foci and functions of SSMR are analyzed in this work.

Framework 2: Negotiating a Joint Enterprise in "Figured Worlds"

U3 examines how individuals within student groups negotiate to reconcile what the group is trying to

accomplish together, i.e., their joint enterprise (Nolen et al., 2012; Wenger, 1998). In addition, this perspective incorporates "figured worlds" (Holland, Lachiocotte, Skinner & Cain, 1998; Jurow, 2005) as a way to examine the social worlds in which students are simultaneously immersed. In our illustrative case, students are immersed in the "school world," where they must satisfy instructor expectations, and the "engineering world," i.e., the world of practicing engineers. Each world has distinct values and roles, which sometimes conflict. The closer a group's joint enterprise is to what occurs in engineering practice, the more authentic the activity. In addition to negotiating the joint enterprise, groups negotiate a division of labor and workflow. With regard to the negotiation of group activity, this perspective affords investigation of the nature of a group's joint enterprise, the roles students play in negotiation of that joint enterprise, the actions or moves students make during negotiation, and the influence of the negotiation process on the joint enterprise over the course of the project.

Methods

U4 provided the context for the illustrative case. The project studied was delivered in a laboratory course typically taken by students in their final year of an undergraduate engineering program. The three week project was designed to engage students in solving a "real-world" engineering problem via the use of industrially-sized virtual equipment (Koretsky, Amatore, Barnes, & Kimura, 2008). One group of three students was chosen for study because of their high level of engagement as measured by the number of hours they dedicated to the project. The group was audio-recorded and observed any time two or more members met. Analytical methods consistent with studies described above were used on transcripts of the audio-recordings.

Preliminary Findings, Conclusions and Implications

Comparing the frameworks and methodological approaches highlights benefits of each. This poster shows how these different frameworks overlap and are complementary, each emphasizing a different aspect of negotiation in group activity. Their applicability to this new data set means that they can likely be applied, either individually or in an integrative way, to new contexts.

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