

Investigating Norms in a Professional Learning Community

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Research has shown that support from collaborative professional development communities benefits faculty introducing student-centered instruction to their classrooms (Henderson, Beach, & Finkelstein, 2011; Speer & Wagner, 2009). While the RUME community has some understanding of how professional development groups can be effectively formed to support teachers (e.g., Kelley & Johnson, 2022), further research is needed. In this study, I investigate the norms established within one such professional development community: an online working group designed to support teachers' implementation of an inquiry oriented abstract algebra curriculum. Preliminary results indicate that participants established norms related to working on tasks, contributing ideas and responding to each other's contributions, and sharing authority.

Keywords: Instructional change, professional learning communities, sociopedagogical norms

In response to calls for reform in undergraduate mathematics education in the United States, various modes of student-centered instruction have been developed. To support faculty in implementing student-centered curricula, professional development resources like curricular support materials (e.g., Larsen et al. 2013) and summer workshops (e.g., Andrews-Larson et al. 2016) have been developed. This study focuses on online working groups (OWG) that supported mathematics faculty learning to teach inquiry-oriented abstract algebra (Larsen et al. 2016). Prior research has suggested the importance of community building in professional development groups (e.g., Clark et al. 2008, van Es, 2009, Kelley & Johnson, 2022), but the mechanisms by which such communities develop need more exploration. Thus, this case study aims to answer the research question: what community norms develop in online professional development groups?

Literature Review and Theoretical Framework

Inquiry-oriented instruction (IOI) is a type of student-centered instruction aimed at supporting students as they work individually and collaboratively on carefully designed mathematical tasks (Rasmussen & Kwon, 2007). As students inquire into new mathematical ideas, instructors inquire into students' mathematical reasoning, seeking to reveal and leverage students' informal conceptions toward more formal mathematics. Because IOI emphasizes classroom social interactions as grounds for the reinvention of mathematical concepts, it is crucial for teachers and students to negotiate social and sociomathematical norms that foster meaningful learning opportunities within the classroom community (Gravemeijer, 2020). While there has been some research regarding norms in inquiry-oriented (IO) classrooms (e.g. Rasmussen et al. 2005, 2009, 2010; Serbin et al. 2020), recent developments in instructional support for IOI necessitate further investigation into normative behaviors in professional development groups. Primarily, I am interested in understanding the social norms established by Teaching Inquiry-Oriented Mathematics: Establishing Supports (TIMES; NSF Awards: #1431595, #1431641, #1431393) online working group participants as they developed a professional learning community in their online meetings.

A professional learning community (PLC), as defined by Kruse, Louis, and Bryk (1995), is focused on cultivating peer interactions between teachers to improve teaching and learning. A

PLC has five central characteristics: reflective dialogue, focus on student learning, interaction among teacher colleagues, collaboration, and shared values and norms. Similar to Clark et al. (2008), the emergence of OWG social norms was investigated, viewing the OWG as a PLC. Social norms are defined by Cobb & Yackel (1996) as a person's "beliefs about [their] own role, others' roles, and the general nature" of classroom activity (Cobb & Yackel, 1996, p. 178). These beliefs are developed collaboratively between the instructor and students as they interact in the classroom and "characterize regularities in communal or collective classroom activity" (Cobb & Yackel, 1996, p.178). Serbin et al. (2020) documented norms related to working on mathematical tasks, students sharing contributions, and students responding to others' contributions in inquiry-oriented abstract algebra (IOAA). Norms surrounding students contributing to group discussions included sharing contributions, explaining their reasoning, and explaining difficulties they experienced. Finally, norms about responding to others' contributions in group discussions involved asking clarifying questions, being nonjudgmental, and providing productive feedback.

Because professional development literature suggests that modeling the type of instruction expected from participants is an effective strategy (Elmore, 2002), the focus here was on whether norms documented in IO classrooms were present in the OWG. OWG participants often worked through mathematical tasks, discussed their pedagogical reasoning, and provided feedback on each other's instructional practices, a clear parallel to the IO classroom activities documented by Serbin et al. (2020). According to Clark et al. (2008), just as student behavioral norms can be negotiated in a classroom, participant behavioral norms can be negotiated in a PLC. Dick et al. (2018) termed established expectations for participation when teachers talk with their colleagues about instruction *sociopedagogical* norms, taking direction from Cobb and Yackel's (1996) conceptualization of behavioral norms which are specific to the community's content area. Hence, such a conceptualization can be broadened to describe the rules and expectations for the facilitator and participants' behaviors within the OWG as they develop a community of practice, drawing parallels between the social norms previously documented in IO classrooms and those observed in this study.

Sharing authority has also become a central theme of discussion in research on student-centered instruction (e.g. Ball, 1993; Cobb et al. 1992). Given that some classroom activities parallel OWG activities, it is reasonable to suspect that norms surrounding sharing authority may also arise. Because one of the primary goals of IO approaches to teaching and learning is creating a community of mathematical discourse, instructors often avoid resting the validity of claims on "teacherly authority", rather aiming to use their authority in the classroom community to encourage norms surrounding discussion, reasoning, and mathematical argument (Ball, 1993). That is, teachers may take advantage of their ability to direct the future actions of the class with the goal of encouraging students' epistemic authority, which concerns how participants treat themselves and others as more or less knowledgeable rather than concerning the actual depth of individuals' knowledge (Byun et al. 2020). Because the OWG was composed of teachers with varying levels of expertise with implementation and had clear parallels to IO classroom activities, the notion of sharing epistemic authority as a normative social behavior was adopted.

Context and Methods

This investigation takes place within the context of a broader project, Teaching Inquiry-Oriented Mathematics: Establishing Supports (TIMES; NSF Awards: #1431595, #1431641, #1431393), a research and development project focused on supporting large-scale implementation of several inquiry-oriented mathematics curricula at the undergraduate level. To

investigate best practices in bringing IOI to scale, TIMES utilized three forms of instructional supports: curricular support materials, summer workshops, and online working groups. The curricular support materials provided additional online resources to teachers. The summer workshops provided a three-day intensive session where participants became acquainted with the instructional tasks and curricular resources. Finally, the online working groups met for one hour each week during the semester following the summer workshop to work on instructional practices and discuss implementation issues with the goal of providing ongoing, content-specific support.

My primary focus is an online working group (OWG) that met for 14 weeks in the fall semester of 2016. The members of the OWG were engaged in implementing the IOAA curriculum designed by Larsen et al. (2016), a research-based, student-centered curriculum designed to engage undergraduate students in reinventing fundamental concepts of group theory. The group consisted of two instructors currently implementing the curriculum, one instructor preparing to teach in the following academic quarter, and one facilitator with previous experience teaching IOAA. The teachers were introduced to the curriculum materials in the summer workshop and met synchronously online via Google Hangouts once per week to reflect on the curriculum and implementation with a facilitator. Members of the OWG were regularly asked to share reflections on their instruction and investigate the curriculum tasks from a mathematical perspective. These online meetings were recorded and sections were transcribed for retrospective analysis. Social norms were analyzed as they developed throughout these meetings, using a priori codes developed by Serbin et al (2020) and emergent codes from the analysis related to sharing authority. Taking direction from Clark et al.'s (2008) conditions for documenting the development of norms, it was inferred that a behavior was normative to the OWG if it was commonly enacted without prompting, participants did not challenge someone enacting that behavior, and/or participants challenged someone when they did not comply with that behavior.

The OWG consisted of three instructors, Elena, Laura, and Roger, and one facilitator, Mickey. Mickey facilitated the OWG as a former TIMES fellow, having participated in the previous year as a new IOAA instructor. Elena, Laura, and Roger had experience teaching abstract algebra, but had not used IOAA. Because Roger's institution operated on a quarterly schedule, he was unable to teach the course synchronously with Elena and Laura. It is worth noting, however, that Roger was an active contributor in most discussions, and that the OWG continued to meet with Roger after their fall semester classes concluded to support his instruction during the winter quarter.

Results

Throughout the semester, Mickey indicates implicitly and explicitly that he is trying to model IOI within the online working group, making comments like "I hope I'm modeling what I would like to do in the classroom," and even describing the function of the OWG using language commonly applied in IO curricula design: "We're generating teacher thinking, building on teacher thinking, and developing a shared understanding, and then bringing it into the formal world." This supports my investigation of documented classroom social norms developing within the OWG. I found that participants enacted social norms related to working on tasks, sharing and responding to others' contributions, and sharing authority. Illustrative examples are presented below.

Working individually first.

Mickey explicitly stated the expectation for participants to work on tasks individually first with phrases like, “Everybody, take a minute or two to think about it,” and “I want you to take a few minutes before you answer this [question].” After this, participants thought to themselves and worked quietly until prompted to share their thoughts. In one instance, after Mickey had posed a question to the group, Elena began to respond immediately and Roger interjected, “I thought we were thinking to ourselves.” Roger challenging Elena when she did not give others time to think independently serves as evidence that this was an established social norm in the OWG.

Explaining reasoning.

Mickey also encouraged the group to share their ideas, beginning most meetings by inquiring into the teachers’ perspectives and continually asking for their contributions. He also positively reinforced this expectation by emphasizing key ideas, repeating them to the group or saying phrases like, “Can you say that again? We’re going to write it up here on the board.” Encouraging each other’s contributions was commonly enacted by the rest of the group throughout the semester. For instance, after Laura shared some thoughts on a clip of her teaching, Elena responded, “Tell me a little bit more about your thought process.” This is also evidence for the development of norms around participants explaining their thinking. Mickey explicitly stated the expectation for participants to explain their reasoning, saying “I’m going to press my teachers to give reasons for their teaching actions.” This behavior seemed normative, since it was encouraged by the facilitator and enacted without prompting by the rest of the group.

Sharing difficulties.

A similar type of contribution involved participants sharing the difficulties they experienced with curriculum tasks. Mickey would often open a meeting by saying, “So, tell us about your week – what went well, what didn’t?” to encourage participants to share their struggles. For the last 11 meetings, teachers regularly shared about their difficulties without being prompted. In many instances, this contributed to rich conversations surrounding pedagogical moves and inquiring into students’ thinking. After working on a curriculum task about group isomorphism concepts, Roger shared that he “struggled with the additive notation,” explaining that he switched to multiplicative notation with the goal of preventing students from being confused. Elena and Laura then both shared their experiences with developing shared notation in the classroom, which suggests that the norm of sharing difficulties often supported group discussion.

Showing support.

The fact that Elena and Laura responded to Roger by explaining their experiences is also evidence of norms about providing productive feedback. In particular, the norm that participants should be supportive and share their strategies was often enacted throughout the semester. Responding to others’ struggles by sharing strategies was first encouraged by Mickey after Laura described her difficulty with graded work, asking Elena and Roger to discuss their approach to assessment in IOI. Later, it was evident that providing productive feedback was a norm when Elena explained some difficulty she was having with a student during discussion, prompting the group to respond by asking explicitly for their suggestions. It also became normative for participants to encourage each other – when Roger explained that he was overwhelmed by the pacing of the course, Laura responded, “You can do it, you can, you’ll get there!” and proceeded to suggest different strategies to help Roger stay on track.

Sharing epistemic authority.

Mickey also promoted participation by using his deontic authority to encourage participants' epistemic authority. Often, when a participant asked Mickey a direct question, he would redirect it to the entire group, saying phrases like, "So that [question] is for everybody, I can answer later," and "I think this [topic] merits at least a three-to-five-minute discussion. I'll add a disclaimer that I have no idea how to handle that situation." Sharing epistemic authority became a social norm throughout group discussions. On occasion, Mickey would get excited about a topic and monologue for a few minutes. The group nearly always became quiet and tended to not respond to Mickey's monologues, which I view as evidence of participants challenging Mickey for breaking the norm of sharing authority. Because Mickey was challenged for not enacting this behavior, it can be thought of as a social norm within the OWG.

<i>Table 1. A description of online working group norms.</i>			
<u>Category</u>	<u>Norm Name</u>	<u>Description</u>	<u>Prototypical Quote</u>
working on tasks	working individually first	participants engage with content independently before discussing with the group	"Take a few minutes before you answer this [question]."
	explaining reasoning	participants explain their thinking	"Tell me a little bit more about your thought process."
sharing and responding to contributions	sharing difficulties	participants discuss their teaching challenges	"I struggled with the additive notation."
	showing support	participants provide encouraging feedback	"You can do it; you'll get there!"
sharing authority	sharing epistemic authority	facilitator redirects discussions away from his expertise toward group discussion	"So that [question] is for everybody, I can answer later."

Discussion and Questions

The fact that the OWG possesses the characteristics of a professional learning community occurred mostly by design; teacher colleagues were expected to engage in reflective dialogue focused on pedagogical strategies and student learning. The shared norms they established around working on tasks, sharing and responding to each other's ideas, and sharing authority are relatively unsurprising in terms of professional development. However, the fact that these norms parallel the norms documented in IO classroom communities is notable. One norm not previously established in the literature that could be explored further was that of sharing conversational space, since participants regularly noted that they wanted to avoid dominating a discussion and prompting others to respond. In addition to further exploration of norms, this research could provide a basis for designing facilitator training in how to support and intentionally develop productive norms in PLCs.

Questions for the audience:

1. Are there other norms from professional development literature relevant to the OWG?
2. Other aspects of this community were not captured in these norms (e.g., comradery) – how can these aspects be documented and analyzed?

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