

Teachers Learning to Promote Classroom Discourse, Equity, Agency, and Engagement

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Abstract: This interactive poster session highlights findings from the first two years of the Teachers as Learners initiative, sponsored by the James S. McDonnell Foundation. In 2018, ten research teams were funded to explore cognitive, sociocultural, and systemic dimensions of teachers learning to implement challenging instruction and classroom discourse in service of promoting students' engagement and agency in the intellectual work of subject matter learning. The quintessential question these projects address is how teachers learn what they need to know and be able to do to create such contexts. Cross-cutting themes address contexts of professional learning, reflective practice, and iterative cycles of design, enactment, and re-design.

Introduction

This interactive poster session highlights findings from the first two years of the Teachers as Learners initiative, sponsored by the James S. McDonnell Foundation. In 2018, ten research teams were funded to explore cognitive, sociocultural, and systemic dimensions of teachers learning to implement challenging instruction and classroom discourse in service of promoting students' engagement and agency in the intellectual work of subject matter learning. Poster 1 describes the foundational assumptions of the Teachers as Learners initiative and surveys the varied research questions, tools, and methodologies reflected in the funded projects as well as the cross-cutting themes of equity and inclusion. Eight of the ten projects contribute to this structured poster session. They each detail their professional development approaches, tools, and findings to date. The projects encompass a variety of disciplinary content areas: Five focus on math (Posters 2, 4, 5, 7, 8); five on science (3, 4, 6, 7, 9), and four on literacy (2, 4, 5, 7). Teachers work with students of elementary school age, i.e., ~5 - 9 years old (2, 3, 4), middle school, i.e., ~10 - 12 years (5, 6, 7) and high school, i.e., ~13 - 18 years old, (7, 8, 9). The projects rely on distinctive yet overlapping models of teacher learning and professional development.

Organization: Following the Chair's brief introduction (5 minutes), session attendees have 60 minutes to browse and interact with the poster authors. Kris Gutierrez will provide discussion comments (10 - 15 minutes) and entertain questions and comments from the audience (10 - 15 minutes).

Poster 1: Building a knowledge-base of *Teacher As Learners*

Michael I. Swart, Mitchell J. Nathan, Susan Fitzpatrick, and Brent Dolezalek

In 2015, the James S. McDonnell Foundation (JSMF) convened a panel of scholars to explore why research-based educational practices can meet with low rates of uptake by teachers. The panel's deliberations identified teacher learning and teacher change, as a topic often overlooked in attempts to "reform" education. In *Effective Teaching and Successful Learning*, De Florio (2016) noted there are "too many guides and 'cookbooks' that indiscriminately propagate...dozens of techniques and strategies" without concern for how teachers understand, select, and take up these techniques. In light of this, and acting on the panel's recommendations, JSMF launched a research program with the intent of understanding how teachers learn and incorporate into their classrooms a recommended core practice "facilitating communication in the classroom," where "communication" refers to the many ways information can be transmitted verbally, via gestures, documents, demonstrations and interactive media. For its framework, the Teachers As Learners (TAL) program incorporates a "scale-down" methodology with a cognitive science perspective (i.e., findings from "scale-up" research) to identify evidence-based practices that can be leveraged by teachers to improve their classroom instruction while researchers collect data on how cognition, experience, disciplinary expertise, curricula, classrooms, and identity impact teachers' learning across social, institutional and historical contexts. This coupling of cognitive science with a scale-down methodology will enable networks of research teams to focus on how teachers learn in context in order to make educational innovation and improvement viable at scale (e.g. McDonald, Keesler, Kauffman, & Schneider, 2006; Penuel et al., 2011). For the inaugural 2017 cohort, research teams received \$2.5M for 5-year projects investigating Teachers as Learners in language, mathematics, humanities and science instruction as well as projects developing integrated classroom technologies to complement curriculum and instruction.

As a cohort, the JSMF encourages the research teams to work with teachers, in pre-service, coaching, professional development and in their classrooms, sharing techniques for facilitating classrooms, setting goals, planning, creating tasks, delivering instructions, integrating technologies and taking actions that encourage, motivate and engage discourse. By leveraging the affordances of tools to facilitate modern classroom discourse, and documenting, curating, organizing and highlighting their benefit, the portfolio of projects is creating shared resources and a common vocabulary for building a knowledge-base to support teacher learning. At the same time, the projects bring a critical consciousness to teacher and student positionality, resilience, diversity and equity.

Anticipated products of the Teachers as Learners initiative include a rich corpus of qualitative and quantitative data on practices of teachers learning to facilitate high-quality classroom discourse. Teachers and researchers are engaging in co-constructions—co-planning, co-teaching, reflections and sharing experiences, materials, and artifacts across disciplines. Researchers are collaborating, sharing methods and results for creating curricula, developing methods for sampling teachers' implementations, and for capturing, coding, and analyzing rich data. Together, the JSMF TAL initiative aspires to build a cumulative science of the study of teachers as learners, consumers, and contributors to research-based instructional practices.

Poster 2: Examining coaching conversations in mathematics and literacy for evidence of teacher learning

Richard Correnti, Eben Witherspoon, Lindsay Clare Matsumura, Maggie Walsh, Christian Schunn, and Mary Kay Stein

Teacher learning is multifaceted, and while our theory is that it leads to changes in classroom performance, we believe learning should not be measured by classroom performance alone. Evidence of teacher learning can also be witnessed in dialogic conversations with coaches about lesson planning (pre-observation conferences) and enactment (post-observation conferences). We examined these conversations for evidence teachers were acquiring knowledge about conditions for what, when, and why certain moves—aligned with an articulated student learning goal—should be enacted. Our assumption for this model is that dialogic discussions, shown to be fruitful for student learning (Applebee et al., 2003; Franke et al., 2009; Wilkinson et al., 2015), are equally critical for teacher learning. In our coaching model, dialogue happens as the teacher and coach plan and reflect on lessons (e.g., Russell et al., 2019; Matsumura et al., 2019). This format has the benefit of teachers' learning in the same way we want them to teach. Such learning experiences aligned with teaching we want to inject in classrooms is essential for enactment, but often educational innovations ask teachers to teach in ways they haven't experienced as learners (e.g., Elmore, 2016). Our stance is that teachers' learning through discussions about their own practices is an optimal way to produce substantive and sustained changes in their discourse practice.

Our model for coaching has relied on one-to-one teacher-coach conversations. Opportunities to engage in dialogue about teaching and pedagogical decisions is foregrounded in conferences where teaching decisions are key nodes for teachers to engage in building associations about what to teach, as well as when and why to make certain teaching decisions. Coaches facilitate these associations both before (pre-conference planning) and after (post-conference reflection) observations, primarily by facilitating teachers' articulation of how teaching decisions are associated with what students are able to contribute during classroom discussions. For this model, coaches and teachers engage in-depth in a relatively small number (e.g., 5-6 a year) of cycles. Each cycle consists of a pre-conference, observation, and post-conference—all for the same lesson focused on a high cognitive demand learning goal. This format allows teachers and coaches to discuss deep and specific instances of practice and engage in evidence-based inquiry about specific teaching moments, both of which have been shown to lead to growth in teaching practice (e.g., Russell et al., accepted; Matsumura et al., 2018). It is this process that allows teachers to learn as they engage in dialogue, with iterative cycles building teaching expertise over time. We see the learning conditions just described as important for building associations about teaching moves—through consideration of alternative teaching moves (an inherently dialogic exercise)—to be key for co-constructing teachers' conceptual change leading to their adaptive expertise (Correnti et al., accepted).

Poster 3: Elementary teachers' elicitation of students' funds of knowledge to support science learning with representations

Celeste Nicholas, Jessica McClain, Meredith Park Rogers, and Joshua Danish

Representations including physical models and diagrams support science inquiry practices—making key aspects of phenomena salient and helping students construct explanations. The Representations for Teachers as Learners (RepTaL) project supports rural midwestern elementary teachers in incorporating representations into science lessons. We draw upon cognitive and sociocultural learning theories to examine teacher learning, as evident in both knowledge and practice. Through collaborative workshops and individual coaching, we support teachers across stages of praxis (e.g., planning, enactment, and reflection). In previous work, we noticed teachers often explained why they used (or did not use) certain representational forms or activities in terms of student capacity. Teachers described students as lacking prior school-based science knowledge, seldom mentioning another potential resource—student funds of knowledge (FoK) from the community (Moll et al., 1992). We view incorporation of students' science FoK as an equity-enhancing and knowledge-building practice for teaching productively with representations and supporting science inquiry. The present analysis describes the varying ways project teachers engaged students' FoK. Research questions were: 1) How did teachers incorporate students' FoK when planning, enacting, and reflecting on classroom discussions within coached lessons? and 2) In what ways did teachers' views of student capacity influence how they valued and used FoK? We analyzed three cases with maximum variation in how student FoK was elicited in classroom discussions. Data sources included coaching conversations, lesson videos, and interviews about instructional decisions. Coaching data were coded using Kloser's (2014) core science teaching practices. For interviews, we adapted schemes on science teaching orientations (Friedrichsen & Dana, 2003) and teachers' selection of models (Lee & Jones, 2018).

While Teachers 1 & 2 had not articulated a plan for incorporating students' FoK, they elicited and then used students' FoK within the core practices of building community and connecting science to students' lives. They valued outside-of-school knowledge to interest students. In contrast, Teacher 3 planned to incorporate FoK.

Along with the practices enacted by Teachers 1 and 2, she enacted practices associated with building explanations: eliciting and using student thinking, connecting to science phenomena, and constructing and interpreting models. Teacher 3 valued students' outside-of-school knowledge as a resource in science lessons, consistent with conceptions of FoK. She also held the most positive views of student capacity. This study suggests a relationship between the planned use of FoK and the enactment of a wider range of practices in classroom discussions. Further, this study evidences FoK as a resource for inquiry-based science teaching with potential to invite a broader range of student contributions to scientific discussions. Within our design-based research approach, we will develop more explicit tools to support teachers in incorporating FoK in the planning phase. Findings also suggest that teacher orientations toward student knowledge should be a focus of practice-based professional learning designs.

Poster 4: Working alongside teachers to understand and shift disciplines, discourse, and power in elementary classrooms

Lynsey Gibbons, Eve Manz, Annie Wilhelm, and Andrea Bien

We seek to understand how elementary teachers learn to conduct classroom discussions in ways that support deep disciplinary learning and disrupt settled expectations of disciplines, children, and teaching. We draw from descriptions of teaching as relational work (Lampert, 2010), examining how teachers negotiate and reorganize relationships among teachers, learners, and disciplines. We assume that power saturates teaching and learning, from micro-interactions to larger structures. By power, we refer to settled historical and sociopolitical hierarchies that privilege white, colonial forms of knowing, being, and communicating (Esmonde & Booker, 2016). From this perspective, we consider learning to teach in a way that centers power as involving noticing and responding in micro-interactions that are situated in larger systems. In our first phase of work, we have worked with records of experienced teachers developing an understanding of what is possible in facilitating discussions when teachers center power in their work. Further, we have worked to understand the problems and tensions that elementary teachers face as they lead discussions across mathematics, English language arts, and science.

In Phase 2, we are working alongside elementary teachers from an urban school. We partner with all of the teachers across the school because of our commitment to organizing opportunities for teachers to engage in ongoing, collective learning. We are working with teachers to shift systems of power while maintaining a focus on their own problems and tensions, through supporting teachers to recognize and critique the categories and expectations they bring to their work. Together we consider how to reorganize instructional practices in relation to facilitating discussions that engage students in deep disciplinary ways of thinking and disrupt power circulating within the classroom. The professional learning design includes opportunities for teachers to engage collectively in an inquiry cycle, within which they have opportunities to engage with texts to explicitly address matters of race, examine records of classroom practice to engage with deep questions of learning and teaching, co-plan and co-enact instruction, reflect on those enactment, and consider implications for their own classroom teaching (McDonald et al., 2013; Warren & Rosebery, 2011). In this poster, we will explain our design principles and how, as a research team, we partnered with and alongside teachers and school leaders to engage in learning together.

Poster 5: Learning together to lead discussions in literacy and mathematics

Sarah Schneider Kavanagh, Eric Siy, Elizabeth Dutro, Hala Ghousseini, and Elham Kazemi

We approach teacher learning as developing in a community of practice, where teachers engage in collaborative sensemaking and construct shared meanings through professional inquiry around practice (Rogoff, 1995). Specifically, we view teaching as inextricable from the social and cultural contexts in which it occurs and learning as a process of knowing, doing, and becoming (Brown, Collins, & Duguid, 1989; Herrenkohl & Mertl, 2010). Teacher professional inquiry affords opportunities for developing knowledge about teaching in the context of teachers and students' identities (Cochran-Smith & Lytle, 1999) drawn from both the classroom and larger community. Across four research sites, we ground our work in a set of commitments recognizing equity, practices of teaching, and rigorous disciplinary learning as inseparable from one another especially within local contexts. We acknowledge that teachers are critics and creators of knowledge about teaching. This perspective allows us to grapple together about how to positively position students as generators of knowledge (Pandya & Avila, 2014).

In partnership with local schools that serve communities with rich cultural, racial, and linguistic diversity, we co-designed a PD structure which we call Learning Labs (LL). In each LL, teachers engage in cycles (McDonald, Kazemi, & Kavanagh, 2013) of professional inquiry focused on leading disciplinary discussions in mathematics and literacy. In LLs, teachers and teacher educators come together to co-plan lessons that they enact all together in one of their classrooms, at times 'passing the chalk' and at times pausing to discuss students' ideas and instructional next steps. Each of these enactments is followed by a reflection in which teachers discuss the

experience they just had in light of the team's commitments. In this poster, we illustrate how each site's construction of the LL opened opportunities for teacher and teacher educator learning.

Poster 6: The Virtual Study Group as a context for supporting teacher learning and studying teacher cognition about implementation and promotion of classroom discussion

Chris D. Griesemer, Aliza Zivic, Kelsey Edwards, Christina Murzynski, J. F. Trey Smith, Jessica L. Alzen, Cynthia Passmore, William R. Penuel, and Brian J. Reiser

In preparing for richer disciplinary discussion in their science classrooms, teachers understandably encounter a number of challenges during both planning and enactment even when presented with and oriented to curricular resources built around sensemaking and accompanying pedagogical tools. To more fully understand teacher cognition in this context we build on the framework introduced by Remillard and colleagues (e.g. Remillard 2005) who argued for a "participatory relationship" between teachers and instructional materials—teachers' understandings shape their use of instructional materials and are shaped by their experiences using them. As a community of practitioners and researchers supporting practice, we've begun to characterize some recurring, common challenges teachers face in their classrooms and have begun to address these in both our professional development workshops and in the supports we provide teachers alongside curricular materials. However, if we really want to understand teacher learning while preparing for and enacting discussion-based sensemaking lessons, we need to engage in continued support as they implement these lessons in their classrooms and reflect on their practice. One model for continuing partnership is facilitated, regular meetings in virtual space.

Virtual study groups (VSGs) provide a space for collaborative learning and include members working through a common lesson or set of curricular materials in their classrooms—sometimes asynchronously but focused around a common set of supportive curricular materials. A facilitator who is intimately familiar with the curricular materials leads discussion around successes and challenges participants offer through their pre-meeting posted reflections and their in-the-moment recognitions and responses to peers in the study group. Though the particular conversation starters are often an outgrowth of carefully-planned prompts from VSG facilitators, the goal is to see how teacher-driven conversations about their practice provide insight into teacher cognition.

Using VSGs, we have revisited and reconsidered topics covered previously during intense summer training including: establishing classroom norms around student talk and collective generation of science ideas, using phenomena and inviting student questions about them, and tracking the development of powerful explanatory (model) ideas over time. By reengaging with these topics as teachers are working with their students, we have uncovered not only real-time challenges and barriers to implementation, but also some of the underlying causes and tensions. In the VSGs, teacher-driven conversations have highlighted unanticipated time and logistical restrictions, varied and contextualized views of students' ability to do the work, and resistance stemming from both teacher and student ideas about what constitutes academic "rigor" in science education. We are interested in how these discoveries relate to several constructs we feel are key to success in sensemaking classrooms. More importantly, however, we seek to uncover what they tell us in order to better inform our collaborative work.

Poster 7: Teachers learning to orchestrate discourse in mathematics, science and literature classrooms

Allison Hall, Susan Goldman, and Monica Ko

Teachers Orchestrating Disciplinary Discourse (TOD²) aims to understand what teachers need to learn and how they learn to design and enact instruction that promotes productive disciplinary discourse (PDD) in the classroom. PDD reflects the use of disciplinary core ideas, principles, constructs, prior knowledge or experiences, and rhetorical forms for purposes of solving problems, constructing arguments, and/or making sense of information in the focal discipline (Goldman et al., 2016). Prior research, including our own, provides evidence that classroom discussions make disciplinary thinking visible while also allowing space for students to share and debate multiple interpretations, explanations, and solutions (Applebee et al., 2003; Wilkinson et al., 2015). TOD² focuses on these issues in three disciplines (mathematics, science, and literature) in middle and high schools. In Phase 1, we explored how teachers involved in our prior projects were able to shift instructional practices from didactic knowledge transmission toward an inquiry orientation in which students do the intellectual work of the discipline. We are using the Phase 1 findings to inform our work with a different set of teachers (Phase 2) and districts (Phase 3) around shared goals of moving toward PDD in mathematics, science, and literature.

Phase 1 involved teachers from two previous research projects, one focused on promoting formative

assessment in middle school math and the other on promoting evidence-based argumentation in 6th-12th grade science and literature classrooms. These teachers partnered with researchers they had worked with in the two prior projects to reflect on powerful learning experiences during those projects, in the context of viewing videos of their classrooms collected during the projects, as well as artifacts and video recordings from the PD they participated in. The reflections identified what changed in classroom practice across time, what learning influenced those changes, and what experiences contributed to the learning. Analyses indicated greater emphasis in classroom instruction on students actively reading, reasoning, and arguing about important principles and ideas in the disciplines. All teachers indicated that enacting instruction and reflecting on one's own classroom practice were powerful learning experiences and noted the value of conversations with teachers in other disciplines. Literature and science teachers reported that interrogating one's own disciplinary practices by engaging in an authentic disciplinary task during PD helped them re-conceptualize the design of disciplinary instruction for their students. Analyses of individual teacher cases trace a variety of learning trajectories and critical learning incidents.

The Phase 2 work builds on the findings from Phase 1 regarding powerful learning experiences. Teachers participate in learning activities in three collaborative contexts: teacher-researcher planning and reflection on instruction; cross-site within-discipline explorations of aims, inquiry methods, and discourse practices specific to each discipline; and cross-disciplinary discussions to surface common problems of practice as well as discipline-specific issues. District-level partnerships are supporting the Phase 2 work to ensure that goals, expectations, and forms of evidence are mutually understood, agreed upon, and support the work at the teacher level.

Poster 8: The use of StoryCircles to support teachers' ability to anticipate and manage whole class discussions of novel mathematical tasks

Patricio Herbst and Amanda Milewski

We share work from an ongoing design-based research project in which we are exploring how to use StoryCircles to support teachers' decision-making related to managing classroom discourse about novel tasks. StoryCircles is a process that engages teachers in collaboratively representing a lesson using a storyboarding tool through iterative cycles of scripting, visualizing, and arguing about alternatives for the same instructional moments (Herbst & Milewski, 2018; Milewski, et al., 2018). In our current work, we investigate the potential of StoryCircles for both understanding and intervening on teachers' instructional practices to help them gain resources needed to support their decisions about how to handle students' mathematical contributions in whole class discussions.

On the one hand, much has been written about how teachers steer classroom discussions using discursive norms particular to pedagogic exchanges but unrelated to the content of instructional exchanges (e.g., Herbel-Eisenmann & Breyfogle, 2004). On the other hand, Herbst and Chazan's (2012; Chazan et al., 2016) theory of *Practical Rationality* posits that teachers' decisions in mathematics instruction can be accounted for by bringing together both social and technical (subject-matter specific) considerations—such as the norms of instructional situations. In this poster, we share our initial findings, which are two-fold. First, we share StoryCircles' potential to provide teachers with opportunities to engage in professional experimentation of instructional practices that breach both discursive and situation-specific norms related to whole class discussions. Second, we share ways in which more and less subject-specific features of classroom discourse (e.g., the nature of a student's mathematical contribution vs that student's individual characteristics, respectively) inform teachers' reasoning as they make decisions about how to respond to students' mathematical contributions in the simulated setting of StoryCircles.

Poster 9: ClassInSight: Insight on Teacher Learning by Scaffolding Noticing and Reflection

Amy Ogan, Sherice Clarke, Andrea Gomoll, John Zimmerman, and Jesus Calvillo

A critical component of teacher learning is receiving formative feedback on one's performance, which enables reflection and noticing of key features of problems of practice. Reflection, which involves the work of noticing and interpreting key features of problems of practice, enables teachers to take the formative feedback they receive and translate it into action. There has been rising interest in technologies to assist teachers in noticing core features of instruction to drive teacher learning and instructional change. In this project, we examine how secondary science teachers learn to facilitate science argumentation discussions as they engage with scaffolded noticing and reflection, provided through a technology (ClassInSight). We investigate the cognitive and motivational factors that support deep engagement with teachers' data and which drive change. By capturing classroom discussion data and transforming it into personal informatics using features of their class discussions, we investigate three outcomes: (a) change in teachers' beliefs regarding classroom discussion, (b) change in teachers' knowledge of effective strategies, and (c) change in teachers' behavior regarding the implementation of these strategies.

We operationalize an empirically derived model of teacher growth in practice (Clarke & Hollingsworth, 2002). First, it conceptualizes the dynamic and recursive relationship between professional development, pedagogical actions, and consequences of teaching. Second, it conceptualizes enactment (i.e., teaching) and reflection as central to growth processes. We systematically examine and elaborate this model by studying structured scaffolding teachers' *noticing and reflection* (N&R) on classroom discussions in science (Gerritsen, Zimmerman, & Ogan, in review). Our conceptual framework (Figure 1) includes four iterative stages through which teachers pass as they refine practice: 1) Taking pedagogical actions which produce some type of feedback to engage with, 2) noticing features of their teaching, leading to 3) scaffolded reflection, which then sets up 4) data-driven planning for the next action. A critical component to be explored in this theoretical framework is the structure and means through which a teacher receives feedback on their performance, which enables N&R on key features of problems of practice (e.g., Gerritsen et al., in review; Erickson, 2011; Brunvand & Fishman, 2006). Until now, receiving this data routinely has been difficult, as quantified representations of teacher performance are difficult to capture without technology. Even with technology, the opportunity to learn through N&R has to date been relatively unscaffolded and has therefore not yet led to significant changes in teaching practice (Chen, Clarke, & Resnick, 2015). This project addresses a deep need to understand precisely how scaffolding N&R can support teacher learning in high need settings.

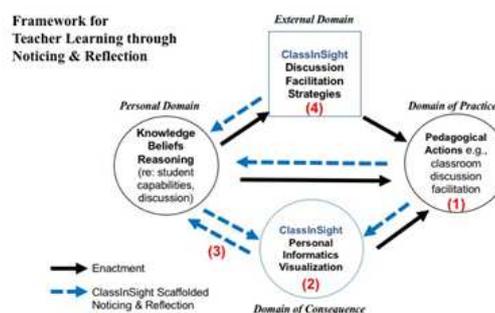


Figure 1. Framework of Teacher Learning through N&R.

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