Availing Orientations and Facilitating Behaviors: An Emerging Framework for Change Leaders[1]

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Scholars and practitioners in higher education recognize that transformational change of organizations—especially departments and institutions—is difficult but essential to achieve needed, national-scale improvements in access, quality and equity in STEM instruction and career development. Based on studies of change projects in college mathematics education and gender equity on STEM faculties, we identify and describe a suite of common leadership approaches among change agents who led these projects. We propose that these approaches function as constructs for an emerging framework about change leadership. By observing how change agents lead complex change projects in higher education, we seek to develop theory about leadership for organizational change and to offer practical guidance to such leaders.

Keywords: institutional change, departmental change, leadership

RUME scholars are well familiar with calls for mathematics departments across the U.S. to improve student success in introductory mathematics courses (PCAST, 2012). Concerns about passing rates in these courses, coupled with student dissatisfaction with an overpacked curriculum that has little connection to their interests, are not new problems (e.g., Seymour & Hewitt, 1997; Seymour & Hunter, 2019). In response to these ongoing problems, professional societies have called for increased uptake of active learning, which is known to improve student outcomes (e.g., Abell et al., 2018; Freeman et al., 2014; Saxe & Braddy, 2015).

Such efforts to improve undergraduate teaching and learning in mathematics are not new. Decades ago a set of major, NSF-funded calculus reform projects sought to create a "lean and lively" calculus (Douglas, 1986). These largely focused on creating and disseminating new curricula and lab activities as the primary lever for change. These materials offered more challenging and relevant problems and often deployed small group work as a primary teaching strategy. Research on college STEM education was in its infancy and researchers were not ready to provide guidance for this kind of work in higher education. In retrospect, we can recognize this approach as insufficient: by focusing on new materials, calculus reform engaged a subset of faculty, but could be largely ignored by many others. High-quality instructional materials are necessary but not sufficient to motivate reform (Henderson et al., 2011).

Today, research-based materials and classroom approaches are widely available for many college courses (Fairweather, 2008). In addition to high quality instructional materials, current innovations are embracing inclusive active learning via sustained professional development. Helping individuals to develop the classroom skills, foundational knowledge of learning, and availing beliefs is essential support for their effective use of research-based curricula (Yoshinobu et al., 2022). Yet relying on individuals to take up innovative materials, one by one, is a slow route to widespread change. The most promising reform approaches today focus on deploying these resources—research-based materials and effective professional development—in a department-wide context with explicit attention to local culture and norms (Laursen et al., 2019).

In this paper we offer some insights derived from our work as scholars examining organizational change in higher education, particularly at the level of departments and institutions. Based on our studies of two quite different sets of change projects that use different interventions to accomplish distinct change goals, we identify a suite of common leadership approaches among change agents who led these projects. We classify these approaches, discuss how they manifest in change projects, and propose that they function as constructs for an emerging framework about change leadership. By asking how change agents lead complex change projects in higher education, we seek to develop theory about leadership for organizational change and to offer practical guidance to those doing such work.

Conceptual Foundations

While leadership and institutional change has long been a focus of scholarly inquiry in higher education (e.g., Eckel et al., 1999; Birnbaum, 1991), this area of research has yet to be broadly taken up in STEM reform contexts (Reinholz et al., 2020). In situating our theory-building contribution to this emerging field of inquiry, we draw on the distinction between a global change theory and a local theory of change (Reinholz & Andrews, 2020). A global change theory is an overarching, meta-level framework of ideas that provide backing or justification for the change process, typically empirically informed and grounded in ideas from fields such as sociology, psychology, or management. Examples include the Four Frames model (Bolman & Deal, 2008), the Networked Improvement Community (Bryk et al., 2015), and the River model (Elrod & Kezar, 2015). Such frameworks offer 10,000-foot views that neither refer to specific change projects nor outline specific interventions but may be used to explain or predict.

In contrast, a local theory of change is a project-specific description that links the overall goals and rationale to desired outcomes, planned activities, and indicators or metrics to explain how the intended local change is expected to come about. Thus, a local theory of change is pragmatic and action-oriented compared to a formal change theory. It may be graphically represented in a logic model or driver diagram (Kinzie & Kuh, 2017), and represents a ground-level view of a particular change plan for a particular place and time.

The framework for change leaders that we begin to develop here takes a 100-foot perspective situated somewhere between a global change theory and a local theory of change. As we detail below, the framework constructs include availing orientations and facilitating behaviors. We use these constructs to characterize change leaders' work, not to prescribe specific interventions or actions. They are aspirational, intended as touch points for decision-making. Local context and goals will drive how they manifest or take shape. In sum, if the local theory of change describes *what* work is to be done, our change leaders' framework offers advice on *how* to accomplish it.

Study Contexts and Data Sources

The authors have separately studied institutional and departmental change in different higher education contexts: efforts to change undergraduate instruction in mathematics departments, and efforts to advance gender equity on STEM faculties. Here we briefly describe these settings and the studies that support our cross-case analysis involving multiple cases of change projects.

Departmental Reform in Mathematics: The SEMINAL Project

The Student Engagement in Mathematics through an Institutional Network for Active Learning (SEMINAL) project was an NSF-funded effort to better understand mechanisms for initiating and sustaining department change focused on implementing active learning in undergraduate mathematics classes. The project began with retrospective case studies of six

departments that had implemented active learning in their precalculus and calculus courses (Smith et al., 2021b). The second phase of the project consisted of longitudinal case studies of nine mathematics departments as they rolled out their own change initiatives. Each sought to shift department norms to enable greater uptake of active learning in their precalculus and calculus courses, supported by nominal funding and a networked improvement community to help accelerate their local change efforts. The national call for SEMINAL participants drew 37 proposals, reflecting high interest in departmental approaches to change.

Two overarching themes characterize the change interventions chosen by the nine departments. First, many developed approaches to support instructors as they implemented active learning approaches in their classrooms. They created or adapted active learning instructional materials, offered professional development that met instructors where they are, and nurtured communities of practice. Second, departments created or reimagined the structures and policies that shape instruction from outside classroom walls. For example, departments created curricular structures to organize faculty around thematic groups of courses, developed course coordination policies and practices, and curated a wide range of instructional support materials in an accessible, easy-to-use format. All of these efforts sought to lower barriers that can prevent instructors from implementing the desired classroom changes and to establish norms of coordination and collaboration that help to align multi-section courses.

For this paper, we make use of SEMINAL data about the nine Phase 2 departments. Primary data include project reports that summarized interviews with project change leaders, faculty, administrators, student focus groups, and classroom observations, collected annually over three years. The SEMINAL team also interacted with campus team members via webinars and summer workshops. We conducted secondary analyses of these data and drew on these projects' own writing about their work, published in a special issue of PRIMUS (Smith et al., 2021a).

The ADVANCE Institutional Transformation (IT) program

The U.S. National Science Foundation initiated its ADVANCE program in 2000, calling for systemic approaches to address the persistent problem of women's underrepresentation on STEM faculties. Past programs had supported individual women but left untouched the biased institutional processes and hostile environments that generated the career challenges that women widely faced (Rosser & Lane, 2002). Taking a new tack, ADVANCE supported institutions to identify and remediate those structural and cultural barriers to women's recruitment, retention and advancement, and to share their strategies and tactics widely through both scholarly research and practice-focused dissemination. By 2023, NSF had made nearly 70 awards for Institutional Transformation—sizable ($3M) five-year grants to single institutions—and over 250 awards for adaptation, partnership and research that enable others to adapt and adopt the strategies and tactics developed across the ADVANCE community (Laursen & De Welde, 2019).

As a group, ADVANCE IT grantees have developed a variety of strategic interventions to address core challenges that face women STEM faculty. Laursen and Austin (2014, 2015, 2020) studied the strategies developed and tested by early ADVANCE awardees, and categorized them according to the core problem each addressed and the approach taken to address that problem. Laursen and Austin observed four broad strategies, aimed at (1) interrupting implicit bias in evaluation of faculty for jobs, awards or advancement; (2) improving workplace environments; (3) supporting faculty to fulfill both personal and professional responsibilities; and (4) fostering individual success. Within each broad type of strategy, an array of several specific interventions used in distinct settings is richly described in an online toolkit and book (2014, 2020).

For this paper, we draw on secondary analyses of data and insights gained from over two decades of work with ADVANCE as an evaluator and researcher. Primary data include interviews with 19 principal investigators, focus groups with 18 institutional teams, site visits to five campuses, and two working meetings with 27 change leaders, as well as deep analysis of a large library of documents gathered from over 40 ADVANCE IT projects.

Findings: An Emerging Framework for Change Leaders

It is challenging to shift organizational cultures to make the use of active learning the norm rather than the exception, and SEMINAL departments' progress varied from moderate to substantial. Given the often intransigent nature of departmental change, even moderate progress is a marker of success. The same is true of ADVANCE Institutional Transformation projects: institutions' progress on STEM faculty gender equity was variable, nonlinear, and context-dependent. Though they may seem very different on the surface, what these change projects have in common is that each used a variety of strategies as levers for change (Laursen et al., 2015). No single tactic alone did the job; rather, projects made headway through selecting and combining interventions to build a strategic portfolio that fit their local circumstances and conditions.

Building on the strategic choice of interventions, we noticed that change projects were impactful when the interventions within the portfolio were coordinated, synergistic, and guided by shared language and principles. In this analysis, we focus not on the specific change goals (improving student success in calculus; advancing gender equity) or interventions (shared materials, professional development; implicit bias training, partner hiring policy). Rather, we identify approaches that change leaders used in guiding their projects. Just as each project deployed a mix of interventions to accomplish targeted, local goals, likewise change leaders used a diverse toolkit in leading their group. We identify ten leadership approaches seen in change projects: five availing orientations and five facilitating behaviors (Figure 1). Below we describe these, with examples mainly from ADVANCE, then highlight a case study from SEMINAL.

Availing orientations	Facilitating behaviors
Considers a unit of change beyond the individual	Co-opts or plugs into existing structures
Takes a systems approach to change	Makes new ways of working easier
Attends to context and culture	Foregrounds inclusive practices and equitable outcomes
Leverages a theory of change	
Promotes a non-prescriptive, asset-based view of people and system components	Addresses people's needs for a sense of purpose and meaning in their work
	Regularly communicates with stakeholders

Figure 1. An Emerging Framework for Change Leaders: Availing Orientations and Facilitating Behaviors

Availing Orientations: Mindsets for Change Leaders

Following Muis' (2004) labeling of students' beliefs about learning, we label change leaders' beliefs as "availing" if they avail or advantage the desired change outcomes. This terminology avoids value judgments of beliefs as 'better' or 'more sophisticated.' We call them "orientations" to recognize that they are not dogmas but mindsets: ways to frame or think about a situation.

The first two orientations are foundational for leaders. In *considering a unit of change beyond the individual*, leaders focus on the goal of changing whole courses, curricula, processes, or programs. This does not mean that everything is upended at once! Rather, it portrays the

concern of interest as a shared responsibility. While changes in individuals' knowledge, beliefs, skills and behaviors may be needed, leaders emphasize collective decisions and actions rather than calling out individuals' views and behaviors as the source of a problem or its solution.

Taking a systems approach to change acknowledges that the target course or program is a system of interacting parts. People take actions and enact their beliefs as instructors or advisors; physical structures and infrastructures such as physical spaces and add/drop policies steer or limit perceptions and behaviors; assumptions about the needs of client departments or traditions in assessment influence what topics are highlighted, how they are taught, and what is assumed about the needs of the student audience. A course is in turn embedded in the larger systems of the department, college and institution. Taking a systems approach means recognizing those elements explicitly, probing their functions and interactions, asking why things are this way, and looking for ways to rethink, rebuild, or mitigate the negative impacts of different components.

The next two orientations help leaders translate to their own setting these broad, foundational concepts. In *attending to context and culture*, leaders recognize that every organization has a particular context, based on its mission, history, geography, and role in national, state and local education landscapes. Two-year or four-year, public or private, urban or rural, secular or church-related, historically Black or predominantly white: such factors may reflect real differences in how problems appear and what strategies may work. Outside factors also shape a department, such as its relationships with other departments or with high schools whose students enroll in their courses. And context varies over time. For example, economic trends determine if the department can hire instructors or must tighten its belt; and changes to state policy may shift what courses the institution must provide. Contextual factors shape how a problem presents locally, and they mean that strategies cannot be imported wholesale from other institutions.

Thus it is also important for leaders to *develop and leverage a theory of change,* as described under Conceptual Foundations. Elements of a theory of change may draw on scholarship about how people and organizations change, but often more useful to leaders is a local theory that identifies the specific problems to be addressed, articulates the interventions to be tried, and explains the rationale: why will *these* activities help to solve *this* problem? Developing a theory of change forces leaders to articulate their ideas and assumptions before leaping into action, making visible what may be taken for granted. Sharing it can engage others and build buy-in to the rationale and goals of the project. Leaders can also make use of formal change theory to map out and guide interaction among the components of their local theory of change.

The final orientation emerges in part from the others. By conceiving of issues as arising from larger systems, yet accounting for local particularities, change leaders more readily see problems as shared, systems-embedded challenges rather than pointing fingers toward someone "at fault." They learn to spot local resources that can help them engage others or achieve their change goals. By *adopting a non-prescriptive and asset-based view* of the people, programs, and policies that constitute the system, they depersonalize the problem, invite others to be more curious and less defensive, and welcome multiple ideas and strategies for addressing the challenge.

Facilitating Behaviors: Tactics with Many Uses

We label change leaders' behaviors as "facilitating" if they facilitate or advantage progress on desired change outcomes. These are not specific actions, procedures or interventions, but approaches to leadership that work in concert with the availing orientations. In this way, the framework sits between formal change theory and on-the-ground local theory of change.

One facilitating behavior is to *co-opt or plug into existing structures*, especially entrenched infrastructure, relationships, and policies. Within departments, this may mean introducing course

coordination or making teaching assignments that support use of common teaching materials and strategies. Co-opting existing structures may be less work than inventing new ones, and the solutions that emerge are more readily sustained if they are already embedded in the workings of the department. Conceptual structures are often useful too, such as important goals or campus-wide initiatives. Campus ADVANCE leaders met with more whole-hearted support from senior administrators when they articulated their faculty equity goals in language that referenced the institutional mission and mirrored its strategic plan, such as elevating scholarly activity, fostering interdisciplinary research and teaching, or coupling excellence to diversity, as they developed interventions to support women as research leaders or to diversify the faculty body.

Making new ways of working easier is a behavior that helps normalize new or revised ways of working. For example, some ADVANCE teams promoted the use of rubrics to fairly evaluate faculty job candidates, and developed templates and training to help search committees craft and use rubrics. These tools lessened committees' work to develop the rubric; using the rubric in turn lessened the work to filter candidates and negotiate ratings, because standards were clear and already agreed upon. Faculty who had experience with rubrics could then lead other search committees, and the rubric became an anchoring structure for new, normative hiring procedures.

A common way that leaders *foreground inclusive practices and equitable outcomes* is through strategic use of data. ADVANCE leaders used institutional data about faculty retention and promotion, for example, to show that gender inequities known from the literature pervaded their own campus, thus disrupting "Lake Wobegon" narratives that such problems happen elsewhere. They learned how to use social science studies to show the systemic roots of sexism and racism to STEM faculty (who are often unschooled in these fields or methods), and they saw values and behaviors shift as people came to understand gendered and racialized institutional practices as due not to individual "bad apples" but as systems built by and for the historic majority. Other ways to foreground inclusion are inviting diverse voices to the table, interrupting microaggressions, or providing opportunities to learn about inclusive teaching and mentoring.

When leaders *address people's needs for a sense of purpose and meaning in their work,* they are recognizing and harnessing the power of the symbolic frame to elevate certain values and give them cultural meaning (Bolman & Deal, 2008). Mathematics department leaders did this when they celebrated early wins in a long-haul change project or recognized project contributors with teaching awards or callouts in the department newsletter or website. ADVANCE leaders did this when they adapted professional development programs to recognize faculty needs for autonomy, linking individuals' goals to collective goals for leadership and inclusion.

Finally, leaders who *regularly communicate with stakeholders* are thoughtful and persistent in identifying what different constituencies need to know about their change initiative. They consider the clarity, coherence, frequency, and consistency of messaging, and how to use local data to inform and persuade different audiences. ADVANCE teams found that strategically tailored communications could build grassroots support, lessen resistance, and recruit allies who shared some degree of common purpose with their work. Speaking to department chairs, for instance, garnered their support when chairs discovered that ADVANCE could help them with mentoring early-career faculty or supporting associate professors in seeking promotion to full.

The Toolkit in Action: Case Study of a Change Project

California State East Bay (CSUEB) faced historically high DFW rates in precalculus (42% DFW) and calculus courses (36% DFW), especially among students from historically under-represented minority (URM) groups. Like many US mathematics departments, CSUEB relied heavily on part- and full-time lecturers. Because many taught at more than one institution, they

often felt isolated or disconnected from the department, and largely relied on traditional lecture. After a multi-year transformation effort, CSUEB created and sustained a strong community of practice that includes lecturers and ladder-rank faculty, initiated a supportive course coordination system, and fostered a culture in which active learning is the new normal. With a keen focus on inclusive practices and equitable outcomes, they also lowered DFW rates to the high teens for all students, and all but eliminated the gap in DFW rates between URM and non-URM students.

Ever mindful of the local cultural value on instructor autonomy, the CSUEB team developed a change portfolio with three primary strategies. First, the team created and curated instructional material focused on "big ideas" and conceptual understanding, all aligned to a master syllabus. All materials were available to all instructors to adopt or adapt, but no one was required to use them. Second, they created a new structure of course coordination, based on a dynamic calendar that offered instructors a pacing guide, suggested group tasks, and helpful comments on content emphasis. Again, these resources were options for instructors to adapt or adopt as they saw best, with change leaders taking an asset-based perspective where instructors were seen as caring and talented, rather than in need of "fixing." Third, and linked to course coordination, they developed a community of practice with monthly meetings that offered instructors a network to support their professional growth, to develop shared understandings, and to build knowledge collectively. This went a long way toward addressing instructors' needs and sense of purpose and belonging.

Together, these three strategies reflect a systems approach to instructional improvement. By offering a variety of resources and embedded professional development opportunities, leaders welcomed all and made the desired change easy, resulting in a "new normal" of equitable active learning. CSUEB's story (Oliver & Olkin, 2022) is not a road map for what others should do, but an example of how leaders' approaches can help a department to succeed in its own context.

Discussion and Implications

In this initial framework, we identify some general ways of thinking and doing change. Observed among leaders of real transformational change projects, they show that meaningful change is possible. That is not to say, however, that leading change is easy. Maintaining the availing orientations may challenge deep-seated beliefs and long-held habits, and enacting the facilitating behaviors requires listening deeply and being open to changing one's mind.

Our focus on leaders shares some commonalities with the empirical investigation of mathematics course coordinators by Martinez et al. (2021), which revealed two orientations to the job (resource/ managerial and humanistic/growth). Knowing these orientations, the authors suggest, can help departments hire and support professional development for these key department personnel. Likewise, our framing of change leaders' availing orientations and facilitating behaviors may help change leaders accomplish their goals and may assist institutions to select and cultivate change leaders whose work will improve the academy.

The availing orientations and facilitating behaviors are neither independent nor linearly related. For example, a change agent's non-deficit view prompts her to seek out data and search for inequities with attention to local concerns about which groups may be privileged or excluded. Moreover, as change agents display these orientations and deploy these behaviors, they can nurture similar mindsets and skills among others, thus broadening or deepening their change coalition. Indeed, recognizing these orientations or behaviors may be a way to identify change leaders whose skills can be further cultivated to share in ongoing work.

At this time the framework is incomplete, as we have identified key constructs but have not specified how they relate to each other. In future work we plan to flesh out these relationships,

seeking both to contribute to theory about leading organizational change in higher education and to develop the framework as a practical resource for change leaders.

References

Abell, M. L., Braddy, L., Ensley, D., Ludwig, L., & Soto, H. (2018). *Instructional practices guide*. The Mathematical Association of America, Inc.

Birnbaum, R. (1991; 2nd ed., 1999). *How colleges work: The cybernetics of academic organization and leadership*. Jossey-Bass.

Bolman, L. G. , & Deal, T. E. (2008). *Reframing organizations: Artistry, choice, and leadership*. Jossey-Bass.

Bryk, A. S., Gomez, L., Grunow, A. L., & LeMahieu, P. (2015). *Learning to improve: How America's schools can get better at getting better.* Harvard Education Publishing.

Douglas, R. G. (Ed.). (1986). *Toward a lean and lively calculus* (Vol. 6). MAA Press.

Eckel, P., Hill, B., Green, M., & Mallon, B. (1999). *Taking charge of change: A primer for colleges and universities*. On Change Occasional Paper 3. American Council on Education.

Elrod, S., & Kezar, A. (2015). *Increasing student success in STEM: A guide to systemic institutional change.* A Keck/PKAL Project at the Association of American Colleges & Universities.

Fairweather, J. (2008). *Linking evidence and promising practices in science, technology, engineering, and mathematics (STEM) undergraduate education*. Board of Science Education, National Research Council, The National Academies.

Freeman, S., Eddy, S. L., McDonough, M., Smith, M. K., Okoroafor, N., Jordt, H., & Wenderoth, M. P. (2014). Active learning increases student performance in science, engineering, and mathematics. *Proceedings of the National Academy of Sciences, 111*(23), 8410–8415.

Henderson, C., Beach, A., & Finkelstein, N. (2011). Facilitating change in undergraduate STEM instructional practices: An analytic review of the literature. *Journal of Research in Science Teaching, 48*(8), 952–984.

Kinzie, J., & Kuh, G. (2017). Reframing student success in college: Advancing know-what and know-how. *Change: The Magazine of Higher Learning*, *49*(3), 19-27.

Laursen, S., Andrews, T., Stains, M., Finelli, C. J., Borrego, M., McConnell, D., Johnson, E., Foote, K., Ruedi, B., & Malcom, S. (2019). *Levers for change: An assessment of progress on changing STEM instruction*. American Association for the Advancement of Science. https://www.aaas.org/resources/levers-change-assessment-progress-changing-stem-instruction

Laursen, S. L., & Austin, A. E. (2014). StratEGIC Toolkit: Strategies for Effecting Gender Equity and Institutional Change. www.strategictoolkit.org

Laursen, S., & Austin, A. E. (2020). *Building gender equity in the academy: Institutional strategies for change*. Johns Hopkins University Press.

Laursen, S. L., Austin, A. E., Soto, M., & Martinez, D. (2015). ADVANCing the agenda for gender equity: Tools for strategic institutional change. *Change: The Magazine of Higher Learning*, *47*(4), 16-24.

Laursen, S. L., & De Welde, K. (2019). The changer and the changed: Evolving theories and practices of change in ADVANCE calls for institutional transformation. *Equality, Diversity and Inclusion: An International Journal, 38*(2), 140-159

Martinez, A. E., Gehrtz, J., Rasmussen, C., LaTona-Tequida, T., & Vroom, K. (2022). Course coordinator orientations toward their work and opportunities for professional development. *Innovative Higher Education*, *47*(2), 327-346.

Muis, K. R. (2004). Personal epistemology and mathematics: A critical review and synthesis of research. *Review of Educational Research*, *74*(3), 317-377.

Oliver, J., & Olkin, J. (2020). A community of practice model for infusing active learning in the classroom. *PRIMUS*, *31*(3-5), 252-268.

Presidential Council of Advisors on Science and Technology (PCAST) (2012). *Engage to excel: Producing one million additional college graduates with degrees in science, technology, engineering, and mathematics*. Office of the President.

Reinholz, D. L., & Andrews, T. C. (2020). Change theory and theory of change: What's the difference anyway? *International Journal of STEM Education*, *7*(1), 1-12.

Reinholz, D., Rasmussen, C., & Nardi, E. (2020). Time for (research) on change in mathematics departments. *International Journal of Research in Undergraduate Mathematics, 6*(2), 147-158.

Rosser, S. V., & Lane, E. O. N. (2002). A history of funding for women's programs at the National Science Foundation: From individual POWRE approaches to the ADVANCE of institutional approaches. *Journal of Women and Minorities in Science and Engineering*, *8*(3&4), 20 pages.

Saxe, K., & Braddy, L. (2015). *A common vision for undergraduate mathematical sciences programs in 2025*. Mathematical Association of America.

Seymour, E. & Hewitt, N. M. (1997). *Talking about leaving: Why undergraduates leave the sciences.* Boulder, CO: Westview Press.

Seymour, E., & Hunter, A.-B. (Eds.) (2019). *Talking about leaving revisited: Persistence, relocation and loss in undergraduate STEM education.* Springer Nature.

Smith, W., Rasmussen, C., & Tubbs, R. [Guest Editors] (2021a). Infusing active learning in Precalculus and Calculus, *PRIMUS, 31*(3-5), 239-657.

Smith, W. M., Voigt, M., Ström, A., Webb, D. C., & Martin, W. G. (Eds.). (2021b). *Transformational change efforts: Student engagement in mathematics through an institutional network for active learning* (Vol. 138). American Mathematical Society.

Yoshinobu, S., Jones, M. G., Hayward, C. N., Schumacher, C., & Laursen, S. L. (2022). A broad doorway to the big tent: A four-strand model for discipline-based academic development on inquiry-based learning. *PRIMUS 33*(4), 329-354.