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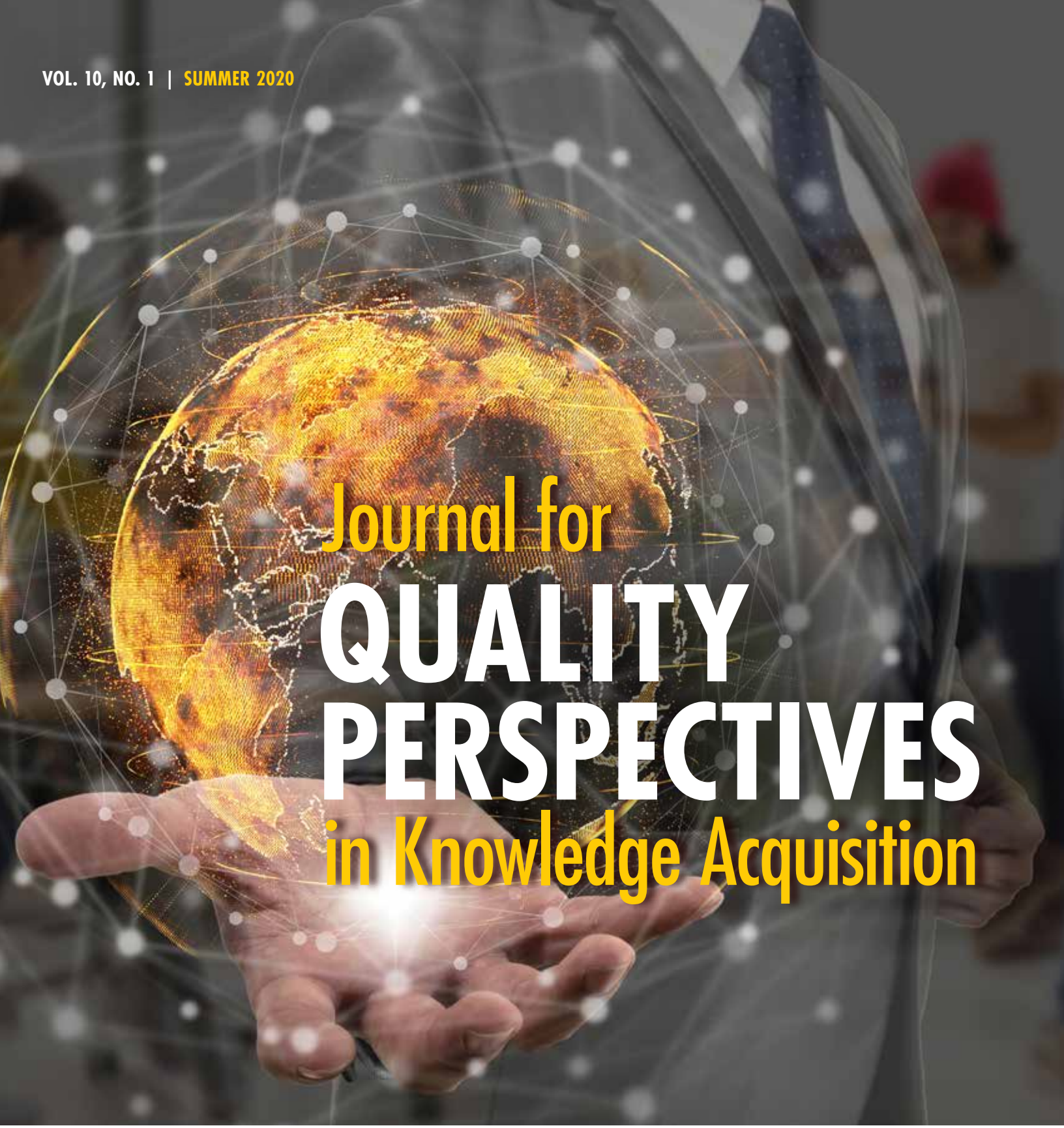

# Journal for QUALITY PERSPECTIVES in Knowledge Acquisition

Working together to create life-long learning and individual and organizational success

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# Journal for Quality Perspectives in Knowledge Acquisition

**Working together to create life-long learning and individual and organizational success**

Vol. 10, No. 1 • Summer 2020



**The Journal That Connects Quality and Education**

*Journal for Quality Perspectives in Knowledge Acquisition* (ISSN currently in progress) is a peer-reviewed publication that is published by ASQ's Education Division, the Global Voice of Quality, and networks on quality in education. The purpose of the journal is to engage the education community in a discussion of significant topics related to improving quality and identifying best practices in education and workforce development; and expanding the literature specific to quality in education topics.



## IN THIS ISSUE:



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Journal for Quality Perspectives in Knowledge Acquisition



## The Observation Tower – a Note from the Editor

*Marianne Di Pierro, Ph.D.*

**Marianne Di Pierro**

The ASQ Education Division is proud to announce the inaugural issue of its new publication, the *Journal for Quality Perspectives in Knowledge Acquisition*, a journal that highlights the innovative, creative, and inspiring work of educators in diverse disciplines. The authors' voices resonate in a harmonious fugue that penetrates the complexities of the educational landscape and fosters intellectual engagement, the seat of regenerative ideas. This array of ideas represents a matrix for quality and continued process improvement through research advocacy. One of the most singular voices in the ASQ orchestral fugue was Deborah Lynn Hopen. Her enterprising spirit touched the lives of so many of us at ASQ, and she embodied a certain courage and a grace under pressure that taught us to reach for the best of ourselves and to strive for excellence. Her recent passing signals to us the importance of these ideals that framed her life, reminders to live life well, with authenticity and purpose, and to use our talents and skills to make a difference.

The work of the authors whose articles are featured in this issue make a decided difference in the world of education. The power of the collaborative enterprise and its transformative capability inspire purposeful change and teach us the value of continuous process improvement: the world can be a far better place.

The work of Jonathan R. Dolle et al. in *Improving Teacher Preparation: An Organizational Approach* delineates the centrality of the application of improvement science tools, methods, and principles to competency- and skills-based curriculum refinement in the California State University teacher preparation programs. In *Transforming Teacher Preparation Through Partnership: Leveraging Improvement Science to Support Teacher Induction,* Flushman et al. recognize the complex transition process from teacher preparation to the first year of teaching. The methods and tools of improvement science they employ establish a learning community that engages new K-12 teachers in community building with peers, reflective thinking, and collaborative problem solving, a triumvirate of approaches to ease the challenges of transition and to encourage retention.

The value of continuous assessment and evaluation in educator preparation programs constitutes the epicenter of the initial work of Simon et al. in a year-long study of data-use practices articulated through an improvement science framework. *An Approach to Building Capacity for Data-Driven Continuous Improvement in California State University Educator Preparation Programs* provides insights into those variables that encompass strategic data use.

Employing the Danielson Observation Protocol, a rubric to enhance teaching proficiency, Beck et al. continuously refine this tool throughout their study in an effort to cultivate optimum observation feedback outcomes to novice teachers and to translate self-reflection into the application of SMART goals. In *Fostering More Deliberate Practice in Teacher Preparation Programs: An Improvement Science Approach to Optimize Observation Feedback Conversations,* the authors use tools that lend toward teacher training, as well as serve as conduits to curriculum development.

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This special issue is bracketed by two articles that serve as preface and epilogue. In their preface, *Improvement Science: An Approach to Making Teacher Preparation More Reliably Effective at Scale*, Parkerson et al. provide an introduction to the theoretical underpinnings of the concept of improvement science that served as the catalyst for the research featured in this Journal. The epilogue by Ware et al., *A Reflective Summary: Common Threads, General Insights, and Challenges for the Future* provides an analytical retrospective that draws the thread through the conceptual matrices that framed these studies.

May you find these articles of use in your own teaching practices.

*Behind the Scenes*: The Journal is the result of a collaborative process among highly skilled professionals whose expertise in the assessment and presentation of manuscripts we recognize in a special page titled *In Appreciation*.

**Dr. Marianne Di Pierro, Ph.D.,** *is former director of the Graduate Center for Research and Retention at Western Michigan University (WMU). As a graduate education specialist, she has coached more than100 Ph.D. students, across a spectrum of disciplines, to degree completion. She holds graduate faculty status at WMU and is experienced in curriculum design, assessment and evaluation, and policy development. She has been engaged as an expert consultant in graduate education for a law firm. Di Pierro has participated in national research projects on Ph.D. completion and is principle investigator on several of her own studies that examine variables impacting doctoral attrition and retention. She has published articles in peer-reviewed journals and presented her research at professional conferences. Di Pierro is author of the book, Navigating the Dissertation – Strategies for New Doctoral Advising Faculty and Their Advisees, published by New Forums Press, and has worked as a training consultant to graduate advising faculty. She is the current Editor of the Journal for Quality Perspectives in Knowledge Acquisition and serves on the leadership teams for the ASQ Education Division and the Health Care Division. She may be reached at the following email address marianne.dipierro@wmich.edu.*

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In Memoriam

Deborah Lynn Hopen

# Deborah Lynn Hopen (1953-2020): She Shattered the Glass Ceiling

*Gregory H. Watson and Elizabeth M. Keim*

ASQ Past President Deborah Lynn Hopen passed away quietly on Palm Sunday, April 5, 2020. Her life was a role model for the contribution of women to the field of quality management and provides a profound example of how one person can shape the future.

Deborah was trained as an engineer, statistician, and psychologist and became an ASQ Certified Quality Engineer in 1991. She worked for industry as a quality executive at Weyerhaeuser and Xerox and managed her own consulting company for more than 20 years. Deborah served as Editor of ASQ's *Journal for Quality And Participation* since 2000. Most importantly, she was thoroughly professional in her work and provided an exceptional example for service to her profession.

She dedicated her career to quality and was selfless in her devotion to the Society through her work at the section, region, division, and national levels. Deborah was the first woman to be elected as President of ASQ (1995) and she remained exceptionally active in the quarter century following her leadership term. In 2010, she was elected by ASQ as a Fellow and subsequently elected by the International Academy for Quality as an Academician. Perhaps some of the stories of her activities that have not been widely published would help demonstrate the breadth and depth of her contributions to our community:

- In her 40 years of quality management experience she taught statistics, statistical process control, quality management, production management, and production costing at the university level.
- She held elective positions of responsibility at all levels of the ASQ organization from Section Chair to Division Chair to Chair of the national organization.
- From July 1995 through June 1997, she served as President and Chairman of the American Society for Quality. She also has served as President of the Washington State Quality Award Program and the International Standards Initiative. Deborah was also involved leading numerous Washington State cultural and charitable organizations.
- Upon the merger of the Association of Quality & Participation with ASQ in 2001, she served as the APQ-to-ASQ Transition Manager in wrapping up operations in Columbus, Ohio, and transferring the work and intellectual property for inclusion within ASQ.
- An avid writer, journalist and 20-year editor of the ASQ *Journal for Quality And Participation*, Deborah has accumulated more than 200 written papers in various ASQ publications.
- Deborah remained active at the section, divisional and national level throughout the past 20 years working in her local sections, and several divisions (Healthcare, Human Development and Leadership, Lean Enterprise Division, Quality Management and Six Sigma Forum) in a variety of largely thankless tasks (newsletter editor, author of bylaws, policies and procedures, and treasurer were her most frequent activities). Her focus was dedicated to service in the quality community.
- Active in the leadership of the Education Division, Deborah served as both Treasurer and Committee Chair of the workforce development network group. She was

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the founding editor of the division's online journal *Quality Approaches in Higher Education* and also initiated the division's *Workforce Development Brief*.

- Although Deborah preferred to remain out of the limelight, she nevertheless received accolades that her many friends supported. Among the honors and awards presented were:
  - ASQ Distinguished Service Medal
  - American Productivity and Quality Center's C. Jackson Grayson Quality Pioneer Medal
  - IAQ Founder's Medal
  - IAQ Agnes Žaludová Woman of Quality
  - Asia-Pacific Quality Organization Miflora M. Gatchalian Medal for Women in Quality Leadership
  - American Society for Quality, Quality Management Division Roger Berger Spirit Award
  - Frank M. Gryna Award for excellence in a written article on quality management
  - Simon Collier Quality Leadership Award

Deborah became the "First Lady of Quality" as ASQ's pioneering female president and exemplary role model of professionalism throughout her career. Not only can she be seen as a role model for women in quality, but she is also a role model for all professionals for what dedicated service to her profession truly means. She will be missed greatly.

**Gregory H. Watson**

**Gregory H. Watson, Ph.D.,** *holds the EUR ING in Systems Engineering and Industrial Engineering. He is a past Chair and Honorary Member of ASQ and also is the past President and Honorary Member of the International Academy for Quality as well as the co-founder and Honorary Member of the Asia Network of Industrial Engineers. He has been awarded the ASQ Distinguished Service Medal, and the Union of Japanese Scientists and Engineers recognized him with the first W. Edwards Deming Medal awarded to a non-Japanese quality professional. Watson lives in Finland and may be contacted at: greg@excellence.fi.*

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An introduction to the theoretical underpinnings of improvement science

# Improvement Science: An Approach to Making Teacher Preparation More Reliably Effective at Scale

*Emma Parkerson, Melissa White, and Paul LeMahieu*

Pre-service teacher preparation plays an essential role in developing the quality teaching that can be offered to students. However, teacher preparation is characterized by considerable variability in how teachers are prepared that, in turn, produces variability in graduates' teaching practice and effectiveness, both within and across preparation programs (Boyd, Grossman, Lankford, Loeb, & Wyckoff 2009; Goldhaber, Liddle, & Theobald, 2013).

For decades, policy makers, researchers, and practitioners have engaged in a range of large-scale efforts to improve the quality of teacher preparation, many of them motivated by accountability and compliance, such as holding programs accountable for candidate experiences and outcomes. Programs have been required to make outcome data publicly available and then receive rewards or sanctions to incentivize improvements. A second major approach to improving teacher preparation has been investment in research intended to inform and guide practice. This approach is supported by a theory that closing knowledge gaps about what approaches are most effective will lead to better results.

While both research and accountability can play roles in helping teacher preparation programs to improve, both approaches also have serious limitations. Research often presents a mixed or incomplete picture, very often missing essential knowledge necessary for producing quality outcomes reliably and at scale across diverse contexts (e.g., National Research Council, 2012). Accountability focuses on incentives to stimulate motivation, on the assumption that those leading teacher preparation programs both know how and have the wherewithal to improve. But it is often these gaps—rather than the nature of the incentives or a lack of motivation—that is the real problem (e.g., Tyack & Cuban, 1997).

This volume introduces and elaborates a third mechanism for improving teacher preparation. It is one that is focused on closing specific identified gaps in performance, informed by an understanding of the system producing the current results, guided by a publicly shared theory of improvement, and warranted through a process for learning whether program changes are improvements. This approach, called improvement science, offers promise for supporting largescale improvements in teacher preparation because it explicitly addresses the impacts of context on practice, and it provides a disciplined means of testing proposed practices to warrant them as improvements, reducing variability in outcomes. improvement science offers a complement to traditional research approaches that more typically reveal *what* can work. It is one that provides improvement knowledge intended to inform *how* to make things work.

In recent years, improvement science has found utility in a number of initiatives aimed at the professional preparation, growth, development, and leadership of teachers. Many of these efforts have taken the form of Networked Improvement Communities (NICs) (Bryk, Gomez, Grunow & LeMahieu, 2015; LeMahieu, Grunow, Nordstrom, & Baker, 2017), deploying the methods of improvement science in cross-institution networks focused on complex challenges of quality in specific parts of the teaching career continuum. One of these was launched in 2018 by the Raise Your Hand Texas Foundation, bringing together teacher preparation programs from across the state of Texas (Wetzel, et al., 2019). These 11 programs across 10 universities are working collaboratively to improve the preparation of

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teachers across all subjects and grade levels. The first of these networks is focused on the very beginning of the career continuum: strengthening the teacher-candidate pipeline and candidates' perseverance through their course of preparation.

The second network is focused on strengthening the quality of clinical experiences so that all teacher candidates experience a coherent system of high-quality coaching supports.

Reflective of the initiatives described in this volume, early efforts in these Texas networks have focused on the development of a shared understanding of their problems and the systems that give rise to them. Common language and data collection mechanisms, shared theories of improvement, and related testing of changes have begun to generate scalable improvement knowledge for which the NICs provide a uniquely effective social organization for spreading these improvements.

Improvement science has also emerged in the teacher preparation space focused on specific subject areas or teacher populations. The Mathematics Teacher Education Partnership is a set of NICs involving more than 90 universities that was formed in 2012 to address the undersupply of secondary mathematics teachers who are well prepared to help their students attain the goals of the Common Core State Standards and other college- and career-ready standards (Martin & Gobsetin, 2015; LeMahieu & Smith, 2020). In 2014, the American Association of Colleges of Teacher Education (AACTE) invited institutions to participate in a NIC to develop and test strategies to increase the number of African-American and Hispanic/ Latino men receiving initial teaching certification (American Association of Colleges for Teacher Education, 2019). AACTE continues to support this network into testing changes that will lead to improved recruitment, while they are also incorporating improvement science methods into an emerging effort focused on addressing the shortage and lack of diversity of fully prepared and credentialed special education teachers in public schools across the nation.

These networks provide evidence of the interest in and effectiveness of teacher educators working collectively to use improvement science to solve persistent challenges in the teacher preparation sector. The efforts described in this volume add important voices and new insights to this growing base of knowledge. Collectively, they illustrate certain themes that recur as efforts emerge to apply improvement science to persistent problems of practice in education. Here, at the outset, the reader is encouraged to look for and note the ways in which these issues emerge, are defined, and influence the efforts to apply improvement science in these several cases.

Specifically, these themes include the following:

- moving from individual to coordinated collective action;
- the promise and challenge of empirical, data-informed transformation of practice;
- the shift in mindsets necessary to engage in improvement science;
- how significant change at scale can arise from iterative testing of modest changes in practice; and
- the challenges of implementing collaborative partnerships—especially as they may be encountered in the context of higher education settings.

Each of these themes is elaborated in the accounts that follow in this volume, and the reader is urged to be alert regarding them. Collectively, these illustrations of improvement science in practice offer important insights into how it is done—from initiation through execution, from issues encountered to their impact and significance to how they may be addressed. Taken together, they offer much to those who seek a rigorous methodology to instill improvement that is deep, widespread, and enduring.

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Applying improvement science tools, methods, and principles to curriculum refinement in California State University teacher preparation programs

# Improving Teacher Preparation: An Organizational Approach

*Jonathan R. Dolle, Melissa Eiler White, Sola Takahashi, and Corey Donahue*

***Abstract***

This article describes a network-based effort–the New Generation of Educators Initiative (NGEI)–that applies the principles and methods of improvement science to the challenge of improving how new teachers are prepared in the California State University System. The initiative promoted clinically based teacher preparation, situated in strong district-university partnerships, and emphasized data-driven, continuous improvement by funding teacher preparation programs to routinely collect and analyze the data needed to monitor teacher candidates' progress toward competency in prioritized skills and to use the results of that analysis to inform clinical support and teaching during the school year, and identify meaningful programmatic changes. This article describes the overall improvement philosophy of this work and the most intensive of these supports: a professional learning support structure called the Improvement Research Fellowship.

***Keywords***

Improvement Science, Teacher Preparation, Improvement Research, Continuous Improvement, Quality Improvement, Networked Improvement, Systems.

## Introduction

Improving the quality of teacher preparation in a pressing problem in the United States (Goldhaber, Liddle, & Theobald, 2013; National Academy of Sciences, National Academy of Engineering, & Institute of Medicine, 2007). Throughout the last decade the education sector has begun to learn from other sectors—especially health care—about the potential power of improvement science as an approach to improving the quality and reliability of educational systems (Bryk, Gomez, Grunow, & LeMahieu, 2015; Coburn, Penuel, & Geil, 2013; Lewis, 2015). Evidence from an earlier effort to improve feedback for beginning teachers in three large urban districts demonstrates the promise of improvement science methods for tackling persistent challenges in teaching (Hannan, Russell, Takahashi, & Park, 2015).

1. There are four pervasive issues that need to be addressed to enable teacher preparation programs to consistently prepare graduates to enter the workforce able to teach students to challenging standards: There is substantial variation in graduates' teaching effectiveness both within and across preparation programs (Goldhaber, Liddle, & Theobald, 2013).
2. There is a lack of consensus about the subset of expert teaching skills that candidates must learn in order to enter the profession, which is a barrier to ensuring candidates have opportunities to learn and practice high-priority skills (Ball & Foranzi, 2009).
3. Clinical practice provides critical opportunities for candidates to learn to teach effectively. Teacher preparation offers fewer opportunities for clinical practice than preparation programs in other practice professions (Grossman, Hammerness, & McDonald, 2009).
4. Programs offer candidates inconsistent learning opportunities, especially (though not exclusively) in their clinical experiences. For example, cooperating teachers vary

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substantially in their own teaching skills as well as their skills mentoring candidates (Grossman, 2010).

This article describes a network-based effort—the New Generation of Educators Initiative (NGEI), funded by the S.D. Bechtel, Jr. Foundation—that applies the principles and methods of improvement science (e.g., Langley, Moen, Nolan, Nolan, Norman, & Provost, 2009) to the challenge of improving how new teachers are prepared in the California State University System. The initiative promoted clinically based teacher preparation, situated in strong district-university partnerships, and emphasized data-driven, continuous improvement by funding teacher preparation programs to routinely collect and analyze the data needed to monitor teacher candidates' progress toward competency in prioritized skills and to use the results of that analysis to inform clinical support and teaching during the school year, and identify meaningful programmatic changes.

From January 2015 through June 2019, NGEI provided grants to CSU campuses and their district partners to improve their teacher preparation programs (hereafter, TPPs). These resources supported programmatic reforms in five areas: partnership with districts, prioritized skills, practice-based clinical preparation, formative feedback on prioritized skills, and data-driven continuous improvement.

NGEI-funded TPPs also received technical assistance from WestEd, which developed a multipronged technical assistance strategy informed by improvement science. The support included improvement coaching and networked learning experiences with teams at the individual teacher preparation programs funded via NGEI. This article describes the overall improvement philosophy of this work and the most intensive of these supports: a professional learning support structure we called the Improvement Research Fellowship (hereafter, IRF).

Improvement science is an approach to managing organizations that prioritizes the ability to develop, adapt, and implement reliable processes to produce a specific outcome. Because organizations are complex, it can be hard to predict what work processes will lead to the desired outcome. Consequently, organizations need to establish practices that enable them to learn to improve. In practice, this often involves investigations into current organizational processes, structures, and norms; the disciplined testing of changes; and the scaling and management of standard work processes.

Improvement science guides and structures organizational learning by connecting disciplined inquiry to a focused improvement goal. The intellectual foundations of improvement science come from Walter A. Shewhart (1939) and W. Edwards Deming (1986, 2000) who developed and applied improvement approaches to a range of industries, most notably automobile manufacturing (e.g., Womack, Jones, & Roos, 1990). However, improvement science methodologies are now being applied to an even wider range of problems. In 1991, Donald Berwick founded the Institute for Healthcare Improvement (IHI) with the goal of achieving better outcomes in health systems. And more recently, organizational scholars like Peter Senge (1990) and Anthony S. Bryk and colleagues (2015) have worked to adapt improvement science for use in educational systems.

NGEI presented a unique opportunity to use improvement science to improve teacher preparation within the California State University system. (See the introduction in this special issue.) As the continuous improvement technical assistance provider, WestEd introduced improvement science as a conceptual and methodological foundation for building the organizational learning capacity of a network of TPP organizational learning approaches to getting better and as a methodological foundation for targeted improvement efforts within teacher preparation programs. The second section describes the conceptual foundation for this approach. The third section details the specific design and methodology of the IRF, and the final section summarizes the key conclusions from this work.

## Conceptual Foundation

Three principles serve as a conceptual foundation for an organizational learning approach to improvement: all improvement begins with dissatisfaction with the status quo; every system is perfectly designed to get the results it gets; and all improvement requires change, but not every change is an improvement.

### *All improvement begins with dissatisfaction with the status quo*

One principle of effective organizational learning is that motivation to change must outweigh the inertia of the status quo. Given the hard work involved in organizational learning, successful efforts are typically driven by clear dissatisfaction with the way things are, rather than by a vague desire to get incrementally better. Occasionally, such motivation already exists as a result of changes in external conditions—as when, for example, new competition or public pressure increases survival anxiety within the organization. But when there is no existing motivation, leaders can cultivate it.

Kurt Lewin (1947) described this process as "unfreezing," whereby leaders create an organizational context that moves people to feel the need for change. More recently, Edgar Schein (2017) has summarized a range of strategies that organizational leaders can use to prompt dissatisfaction with the status quo while also mitigating the fears often associated with change.

Disciplined improvement work is hard. It takes time, which is a scarce and precious commodity in education organizations. It requires employees to question the way work happens and—on the basis of what they learn from this questioning—to make changes. It depends on having leadership that prioritizes and supports improvement efforts, removes organizational barriers to change, and creates a culture of learning and improvement.

## *Every system is perfectly designed to get the results it gets*

A second principle of effective organizational learning is that it requires a systems perspective—a that is, an understanding that outcomes result from the complex interactions between system elements. Paul Batalden summed up a central insight about systems when he noted that "every system is perfectly designed to get the results it gets" (Conway & Batalden, 2015)—an observation that shifts focus from the knowledge, skills, and effort of *individuals* to the design of *organizations*. When a system does not reliably produce a desired outcome, it is because the processes, structures, or norms of the organization have not been designed to achieve that outcome.

For many people, thinking in terms of systems does not come naturally. The tendency is to place responsibility for negative outcomes entirely on individuals—thinking, for example, that the work did not happen as it was supposed to because the person responsible did not care enough, work hard enough, have the necessary ability. An organizational learning approach, in contrast, focuses on the system, endeavoring to help those working within it to understand the interdependence of their work.

One way to identify interdependencies is to ask *why*—why did work not happen as intended? Maybe the person didn't care about something because they didn't see how their work affects others. Maybe they did care but they didn't have the time to do the work properly. Or maybe they didn't have the ability to do the work because they had never been adequately trained or because no organization-wide standard for how the work should be done was established. Even when undesirable outcomes can be traced to individual action, the systemic forces behind those actions become the object of change.

## *All improvement requires change, but not every change is an improvement*

A third principle of effective organizational learning has to do with the behavior of complex systems. In a simple system, the relationship between cause and effect is straightforward and can sometimes be directly observed. In a complex system, knowing what changes will improve the system is exceedingly difficult, as is knowing what changes will have little effect or might produce unintended consequences.

Don Berwick's observation (1996) that not all change is an improvement helps explain the connection between organizational learning and improvement. To ensure that changes to a system actually make the system better, organizations need a disciplined inquiry process for building knowledge over time. An effective learning process typically involves three components: a working theory about how to improve a system, the collection and analysis of data against which the working theory can be assessed, and a mechanism for testing and learning from changes.

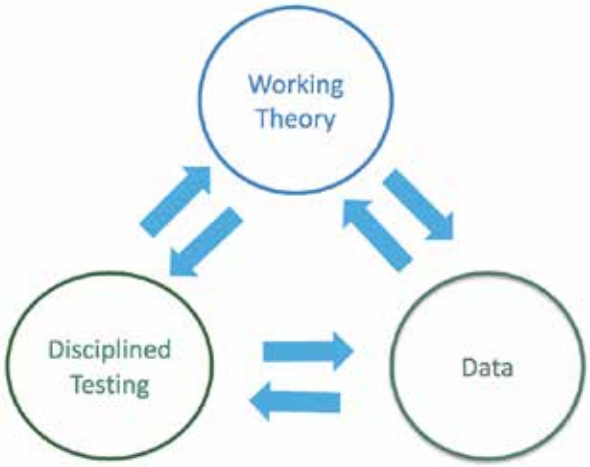


**Figure 1: A Learning System**

The working theory explains what a group of people currently believe about their system and/or their improvement effort. Working theories can explain beliefs about the operation of the current system and why it is producing its current results. These theories can also articulate a target or ideal state—that is, how the system would operate if it was working as intended. Working theories can describe a theory of change—that is, how the current system needs to be modified to achieve the desired state and, thus, desired outcomes. In time, organizational learning informs and gets consolidated in the articulation and ongoing refinement of working theories. (A helpful resource on this topic is "What's Your Theory?" by Bennett & Provost, 2015.)

Data serve as an anchor for developing working theories and as feedback to use in refining theories over time. Both quantitative and qualitative data contribute to this process and can provide a window into the current or baseline performance of a system. Data can also measure progress toward desired outcomes. And, when connected to a system of measures, data support a process for articulating, testing, and revising working

theories. They provide the empirical foundation for organizational learning.

Finally, a disciplined testing process embeds inquiry into the system and into efforts to transform that system. One commonly used tool for supporting disciplined testing is the Plan, Do, Study, Act (PDSA) cycle (Langley et al., 2009), though many more versions of inquiry cycles, including some that are less formal, can also be used. Disciplined testing in an organizational learning and improvement context differs from traditional research in that its primary goal is to produce local knowledge for improving operations and management. Consequently, the PDSA cycle is designed to be quick and efficient, building knowledge through iteration and replication across varied conditions rather than through bigger, slower, and higher-stakes testing or research.

## Structure and Content of the Improvement Research Fellowship

While these principles provide a rationale for an organizational learning approach to improvement, most TPPs need practical guidance and support to engage in focused improvement efforts. This section describes two support structures for strengthening the learning capacity of CSU TPPs.

### *Learning Sprints*

In October 2016, a year and a half before the start of the IRF, the initial improvement technical assistance work with the NGEI campuses was organized as a series of seven or eight "learning sprints." Ten TPPs participated in the learning sprint process, and each was led by a continuous improvement lead—a new role established as part of the NGEI reforms for each program. Each sprint focused on a single learning goal for 90 days. Early learning goals focused on problem identification and investigation, system mapping, and improvement theory building around a focused aim. Later sprints typically focused on prototype development and testing, data collection and analysis, and knowledge consolidation. During each sprint, leads were offered monthly coaching calls and each sprint culminated with a cross-program share-out celebrating the learning from the previous three months. Through multiple sprints, the goal was to build local program knowledge to tackle a focused improvement problem and, in so doing, introduce new habits and mindsets within the campus teams.

From our perspective, the learning sprint process was successful in several respects. The delivery model was largely virtual, with webinars at the beginning of each sprint typically introducing a new improvement tool or concept and coaching over the course of the sprint supporting its effective application while guiding improvement efforts overall. Based on survey results and anecdotal feedback, WestEd found that a number of programs were enthusiastic about the work and eager for more support. And the cross-program sharing at the end of each sprint encouraged sustained focus and helped programs see different, relevant examples of improvement tools and concepts in use.

However, success was also limited by many continuous improvement leads working independently, without a larger improvement team. This was particularly challenging when leads identified problems in work processes for which others were responsible. Some district partners and organizational leaders were not closely connected with improvement efforts and therefore unable to champion efforts within their respective systems. The webinars inherently provided limited support context for introducing and practicing the use of improvement science tools and methods. In addition, participation was limited by uncertain connection of the work to research methodology, the publication demands of tenure, and promotion requirements of universities.

### *Improvement Research Fellowship*

In an effort to build on the successes and address the limitations of the learning sprint support structure, WestEd requested and received funding for a year-long improvement research fellowship from the S. D. Bechtel, Jr. Foundation for 2018-19. The goal of the fellowship was to deepen the organizational learning and improvement capacity of the CSU teacher preparation system by providing intensive, targeted support to a limited number of programs with a demonstrated interest in this work.

WestEd asked CSU programs to submit an application explaining their context, naming their problem of practice, and identifying a team composed of three to four members of the teacher preparation program and representatives from at least one district partner. Teams also needed to identify two organizational leaders with significant roles in their respective systems that ultimately would be affected by the work of the fellowship team. This way these leaders understood the context of the work that is being done and can help champion it in their organizations. The four teams selected included the campuses of California Polytechnic State University, San Luis Obispo; CSU, Bakersfield; and CSU, Fresno as well as the Educator Quality (EdQ) Center out of the CSU Chancellor's Office.

Although the problem focus for the teams varied, each applied improvement science methods to a high-leverage problem of practice in their respective teacher preparation programs. Through their work in the Fellowship, these fellows defined the problem they sought to address, developed an overall goal for their work together, generated a theory of practice improvement, determined measures they will use to determine whether changes they introduced would lead to improvements, and used

a systematic disciplined method to test these change ideas. Each of these steps was facilitated through WestEd using improvement science principles and tools. As a foundation for this work, WestEd drew heavily on two improvement science resources. *The Improvement Guide: A Practical Approach to Enhancing Organizational Performance* (Langley, et al., 2009) introduced the "Model for Improvement" and provided detailed methodological guidance. And *Learning to Improve: How America's Schools Can Get Better at Getting Better* (Bryk, et al., 2015) which provided examples of improvement methods applied to educational problems.

Throughout the course of the year-long fellowship, from August 2018 to July 2019, each team participated in five, usually two-day, in-person learning sessions introducing improvement science concepts tailored to a teacher preparation context. Between trainings, fellowship teams received ongoing coaching from WestEd staff and improvement reviews, where teams would present their work to improvement science experts for feedback. In addition, fellows used this as an opportunity to advance their research regarding how to successfully manage an improvement science project in a teacher preparation program. With the expectation that fellows would publish their work—the culmination of which appears in this volume, the Improvement Research Fellowship met a dual goal of further building a research base for improvement work in the teacher preparation space.

### *Content of the Fellowship*

The fellowship experience was structured in a way that facilitated the fellows building their improvement capacity in each of the three principles listed in the section above. The table below represents how the content of each learning session helped to address where fellowship teams would be developing their skills in certain areas.

The sessions were designed to operationalize each of the three foundational principles outlined in the previous section. With regard to the first principle—"All improvement begins with dissatisfaction of the status quo"—fellows submitted proposals for improvement projects that expanded upon and/or deepened the impact of their NGEI efforts. These proposals were focused on a specific problem of practice that fellows were experiencing and one they wanted eagerly to improve upon. In addition, in learning session two, fellows set clear and specific aims that would keep them focused on the important outcome they had in mind.

With regard to the second principle—"Every system is perfectly designed to get the results it gets"—fellows spent the first two learning sessions investigating their systems to better understand what is producing problems. By conducting empathy interviews with key stakeholders, especially teacher candidates, fellows were able to better learn from those who are experiencing problems firsthand. By examining data on the performance of their system, fellows could better see where and for what groups

**Table 1: Learning Session Content**

| LEARNING SESSION ONE<br>The Improvement Journey and Seeing the System | LEARNING SESSION TWO<br>Theory and Testing | LEARNING SESSION THREE<br>Building Evidence | LEARNING SESSION FOUR (ONE DAY)<br>Sustaining Improvements | LEARNING SESSION FIVE<br>Documenting Learning and Impact |
|---|---|---|---|---|
| – Establish group norms for engaging in improvement work<br>– Provide all participants an experience with an "improvement journey"<br>– Introduce four key improvement ideas:<br>• Learning through investigation and testing<br>• Learning through collaboration<br>• Learning through system analysis<br>• Learning through disciplined practice | – Build our improvement science expertise, setting aside our content expertise hat.<br>– Understand and experience several learning cycles | – Use improvement methodologies to make measurable progress toward their improvement aims.<br>– Understand and be able to articulate the key shifts implied by an improvement science approach<br>– PDSA ramps, common processes, run charts, change packages | – Share and celebrate the progress of the improvement teams<br>– Reflect on how fellows and key leaders can support the institutionalization of improvement efforts<br>– Take stock of three outcomes of improvement work | – Calibration across teams about their articles<br>– Leave with a complete draft of their article<br>– Leave with a specific plan for any next steps/revisions<br>– Teams/fellows will feel a sense of accomplishment: challenge that was met |

they might focus their efforts. And lastly, by mapping the processes that exist in their systems, fellows could diagnose potential problem areas and identify what might be a more ideal system.

For the last principle—"All improvement requires change, but not every change is an improvement"—fellows engaged in a variety of activities to learn what kind of changes might lead to improvement. These specifically centered around the principle's three primary components seen in Figure 1: development of a working theory about how to improve a system, the collection and analysis of data against which the working theory can be assessed, and a mechanism for testing and learning from changes. In the development of a theory of improvement during the second learning session, fellows took what they learned from their systems investigation and used it to develop a working theory (in this case, a driver diagram) that represents their aim and the set of activities that they believe would help them accomplish this aim (for more on driver diagrams, see Bennett & Provost, 2015 and Bryk, Gomez, Grunow, & LeMahieu, 2015).

In order to use data to assess the theory of improvement, fellows spent the second learning session identifying not only an outcome measure that was represented in their aim, but also process measures that could be tracked more frequently and with tighter alignment to particular components of their system (for more on measurement for improvement, see Solberg, Mosser, & McDonald, 1997; Bennett, 2018; Takahashi, White, & Donahue, 2019). The mechanism that fellows used to test and learn from changes was the PDSA cycle (for more on PDSAs, see: Langley et al., 2009). Fellows were coached in the third and fourth learning sessions on the development and prototyping of their first change idea as well as each of the steps in its testing during the second learning session.

Operationalizing this learning loop seen in Figure 1 requires changes in team routines and meeting structures. Through the learning sessions, the fellows learned about how various structures and routines might help create sustainable and lasting improvement. These include meeting structures for various purposes as well as the institution of standard work routines that can help ensure the work continues beyond the length of the fellowship. (for more on improvement routines and standard work, see Grunow, Hough, Park, Willis & Krausen, 2018 and Barnas, 2014).

### *Standards for Quality Improvement Reporting Excellence (SQUIRE)*

At key intervals throughout their improvement journey, fellows consolidated their learning and documented their efforts in writing, ultimately producing the manuscripts collected in the ensuing pages of this journal issue. The writing was produced using the framework provided by the SQUIRE guidelines (Orginc, Davies, Goodman, Batalden, Stevens, and Davidoff, 2015). SQUIRE, which stands for Standards for Quality Improvement Reporting Excellence, was first published in 2005 in the healthcare field, as a way to standardize and to raise the quality of the reporting of quality improvement work. The framework outlines key elements of a written product for an improvement effort, such as pertinent facets of the context of change efforts, or the evolution of a particular intervention or practice as an improvement team's learning deepens. In practical use, the SQUIRE guidelines not only offered a structure for documenting learning, but also provided a way to identify what learning was yet to transpire, but desired.

## Conclusion

The S. D. Bechtel, Jr. Foundation funded NGEI with the goal of better preparing teachers to implement the Common Core State Standards and the Next Generation Science Standards. To accomplish this goal, NGEI has focused on driving improvements in five areas: partnerships, prioritized skills, feedback to teacher candidates, clinical placements, and continuous improvement processes.

To meet the large and growing demands being placed on teacher preparation programs, we believe an organizational learning approach to improving candidate outcomes will be an essential strategy for meeting these demands. Improving teacher preparation is not simply a problem of growing research knowledge or increasing accountability for program outcomes. It requires a focused commitment to improvement, an understanding of the system producing the current results, and a process for learning whether program changes are improvements. Improvement science offers a methodology for learning to improve in this way.

Ultimately, organizational learning and improvement cannot be sustained without the vision and ongoing engagement of organizational leadership. WestEd and SRI have provided continuous improvement technical assistance to interested partnerships through NGEI with the goal of building the capacity of programs. To continue this work, program and system leaders will need to sustain their commitment to learning how to improve the clinical preparation of their teacher candidates.

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Journal for Quality Perspectives in Knowledge Acquisition

Recognizing the complex transition process from teacher preparation to first year teaching

# Transforming Teacher Preparation Through Partnership: Leveraging Improvement Science to Support Teacher Induction

*Tanya Flushman, Sarah E. Hegg, Megan Guise, and Laura Flessner*

***Abstract***

Teacher preparation programs and school districts annually invest significant personnel and money to support cohorts of pre-service teachers and new first-year teachers. Despite this support, the transition from teacher preparation to the first years of teaching remains challenging. In this article, the authors discuss partnership efforts to build a new teacher learning community (NTLC) to support new K-12 teachers in key constructs of transition: belonging, communication, and problem solving. Employing the methods and tools of improvement science, the partnership team established a community that allowed new K-12 teachers to engage in community building with peers, reflective thinking, and collaborative problem solving. New K-12 teachers who participated in the NTLC (n=21) found increased confidence around key constructs at the culmination of the experience. NTLC findings have implications for future collaboration between teacher preparation programs and school districts to jointly support new teachers and together mitigate challenges first-year teachers face.

***Keywords***

New Teacher Learning Communities, Teacher Retention, Improvement Science, Curriculum Reform

## Introduction

New teachers are challenged by the difficult transition from a teacher preparation program into the first years of employed teaching (Johnson et al., 2014). A 2018 study reported: "Those [teachers] without mentoring leave teaching at about twice the rate of those who receive regular mentoring and collaborative planning" (Darling-Hammond, Sutcher, & Carver-Thomas). School districts invest time and money into inducting new teachers, so understanding the challenges that lead to new teachers leaving the profession is paramount. Johnson et al. (2014) have identified conditions for new teacher success and advocate for "innovative partnerships and initiatives that assist smooth transitions to the workforce" (p. 537).

Valuing partnerships between teacher preparation programs and school districts, the authors of this study sought to remain connected to pre-service teachers after the completion of training and help these new teachers hone the skills and dispositions needed to overcome first-year challenges. The district in which this study was conducted had partnered with the teacher preparation unit (elementary, secondary, and special education teacher preparation programs) since 2014 around various education reforms, research, and state-wide initiatives. One such effort was partnering to support first-year teachers. The district had an attrition rate of 6.5 percent (37 teachers) for 2016/2017 and 9.5 percent (55 teachers) for 2017/2018. Forty-three new teachers were hired for 2018/2019, the year of this study, of which 56 percent (24 teachers) were graduates of the teacher preparation programs. In partnership, representatives from both the district and the teacher preparation unit identified initiatives that showed promise for addressing district attrition.

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One promising initiative for supporting new teachers is a professional learning community. Professional learning communities (PLC) support stakeholders in collective learning opportunities that are pertinent and relevant to their practice, improving the overall quality of the system and ultimately enhancing outcomes for student learning. Webb, Vulliamy, Sarja, Hamalainen, and Poikonen (2009) state, "[Teacher communities] play an important role in promoting teacher motivation and welfare believing they are instrumental in preventing teachers from leaving the profession," with new teachers in particular appreciating these communities (p. 412).

Teacher communities show promise for continual learning in ways that traditional professional development does not. In traditional professional development, the content is not typically driven by participants. Learning communities, on the other hand, allow for participants to drive the learning by choosing the areas of practice for focused study (Attard, 2007; Boone, 2010; Westheimer, 2008). This focus on authentic issues fosters "continuous teacher learning" (Vescio, Ross, & Adams, 2008, p. 86) whereby teachers stay engaged in the authentic problems of their work over time (Bolam et al., 2005; Hollins, McIntyre, DeBose, Hollins, & Towner, 2004). Teacher participants in learning communities often describe the opportunity to reflect on their personal practice with invested and reflective others as more beneficial than traditional in-service professional development (Attard, 2007; Duncombe & Armour, 2004). In fact, data show that teachers like to engage in community of practice through PLC-like work (Leite, 2006), and they prefer a communal versus isolationist approach (Snow-Gerono, 2005) to teaching.

## Theory of Improvement Science

The authors are guided by an organizational learning approach with an emphasis on improvement science. Improvement science can be defined as "a family of approaches that guide and structure organizational learning by connecting disciplined inquiry to a focused improvement goal" (Takahashi, White, & Donahue, 2019). Improvement science is guided by the theory that understanding how systems work is key to making positive changes for optimal functionality. It is crucial for improvement teams to understand why the system is producing the outcomes that it does. At its inception, improvement science was largely applied to the automobile industry (Womack, Jones, & Roos, 1990) and later in healthcare (see Donald Berwick and the Institute for Healthcare Improvement). Most recently, scholars have applied these theories to the world of education (Bryk, Gomez, Grunow, & LeMahieu, 2015; Coburn, Penuel, & Geil, 2013; Lewis 2015).

Improvement science work is led by organizational teams interested in affecting positive change. In particular, three key principles guide organizational learning and improvement work (Takahashi, White, & Donahue, 2019). First, improvement begins when there is dissatisfaction with the current state of affairs. Second, each system is created to produce the outcome it gets. Last, change is required in order to improve; however, not all change will lead to improvement.

Improvement science is accomplished with a variety of tools meant to aid organizational learning. These tools and accompanying materials are described in a resource guide written for improvement teams and coaches (Grunow, Park, & Bennett, 2018). When understanding the system, teams will create items such as process maps (a graphic that captures the processes or experience for a user in a system) and a fishbone diagram (a diagram where root causes around a problem are identified). Understanding the system leads to the identification of a theory of change and the creation of a driver diagram (a visual that captures the theory of change including primary and secondary drivers and change ideas) to explain the processes for change. Small, iterative changes can be made to see the impact on the system. These changes are tracked using various scaffolds to capture the effects of the change. One scaffold used to track change is the Plan, Do, Study, Act (PDSA) protocol that details the hypotheses and findings of a small cycle of data collection.

### *Context for Improvement*

The improvement team used improvement science to study the effect of a learning community for new teachers, in particular its potential to increase retention rates and support job satisfaction, ultimately increasing K-12 student achievement. Retention has not previously been a factor used to determine the content of teacher preparation programs, nor has it been used as a measurement of success. This study is distinguished from previous research with its focus on new teacher transition as a conduit for retention while also creating a feedback loop for teacher preparation program continuous improvement. Furthermore, by a teacher preparation program maintaining contact with its graduates during the first several years of teaching, already-established relationships and support continue, possibly mitigating transitional challenges.

The improvement team consisted of one district teacher on special assignment, two teacher preparation faculty, and one grant manager with input from district and university administration. The new teacher learning community (NTLC) itself served as the primary driver of change. Based on literature and empathy interviews (an interview guided by a semi-structured protocol that focuses on eliciting the stories of users who are most impacted by the problem), the improvement team hypothesized four secondary drivers:

1. community building for new teachers,
2. practice engaging in open and productive discourse,
3. engaging in reflective thinking to address common issues, and
4. iterative implementation to support user-focused learning.

Refer to Figure 1 for the driver diagram. Change ideas, targeting the secondary drivers, aimed to help new teachers navigate the first-year transition. For example, NTLC sessions included a Problem of Practice protocol (PoP) to support reflective thinking to address common issues. The long-term project goal was to better support teacher preparation graduates and new teachers hired in the district. For the purpose of this article, the authors highlight data related to one of the secondary drivers—engaging in reflective thinking—and how learnings from PDSAs studying the problem of PoP informed iterative change to illustrate how the improvement team supported the development of reflective thinking.

## Methods

At the outset of this improvement work, the team investigated the existing induction system using improvement science tools, and major learnings were three-fold. First, information gathered during empathy interviews compelled the authors to shift their focus from prioritized skills related to planning and instruction to dispositions/skills needed to successfully navigate the first-year transition (e.g., problem solving; see Figure 2).

Second, the current system supported new teachers; however, coordination was unclear and the teacher preparation program played a limited role (see Figure 3). Specifically, the district required that new teachers participate in a mandatory two-year induction experience sponsored by the County Office of Education. This Teacher Induction Program (TIP) was administered by two full-time coordinators who worked to partner veteran and new teachers and offered district-wide professional development. There was no existing coordination between TIP and any local teacher preparation programs.

Third, although the investigation yielded multiple variables that contribute to retention, the team focused on constructs related to transition as an actionable intervention that might affect positive change. The authors hypothesized that teachers who were not able to "transition" or who experienced difficulty in transitioning were those who most likely would leave the profession, and thus, "retention" was an extended outcome of this study. Transition was the conduit to retention.

New teachers were invited to join the NTLC during the district-wide new teacher orientation. Then, all new teachers were emailed an interest survey and invitation to the first session.

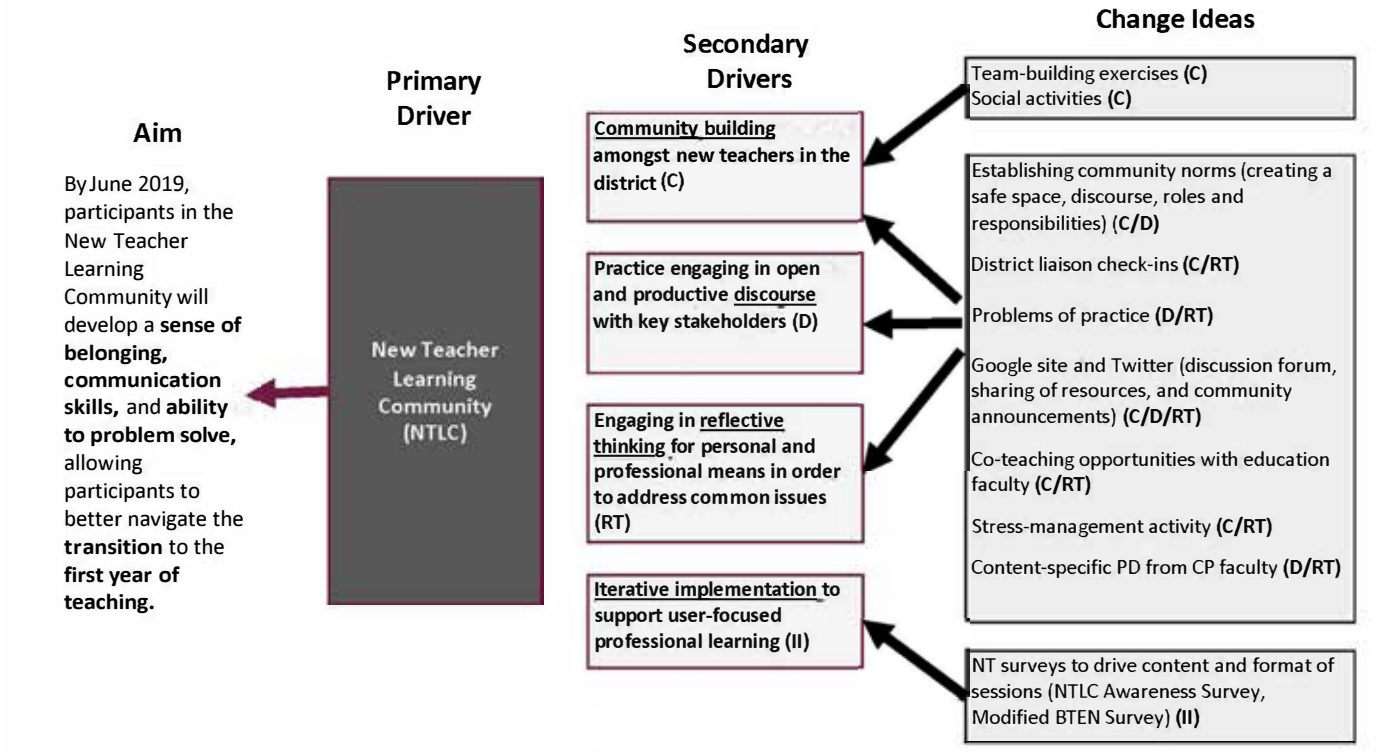


Figure 1: Driver Diagram

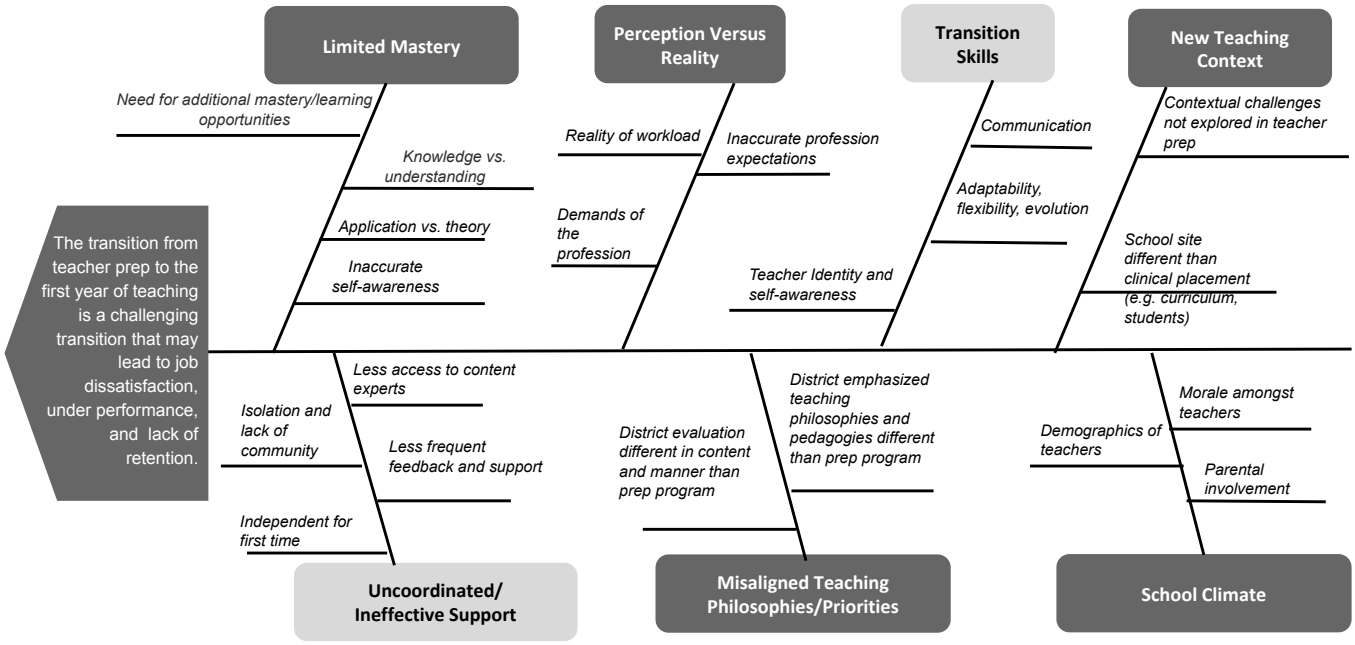


Figure 2: Fishbone Diagram

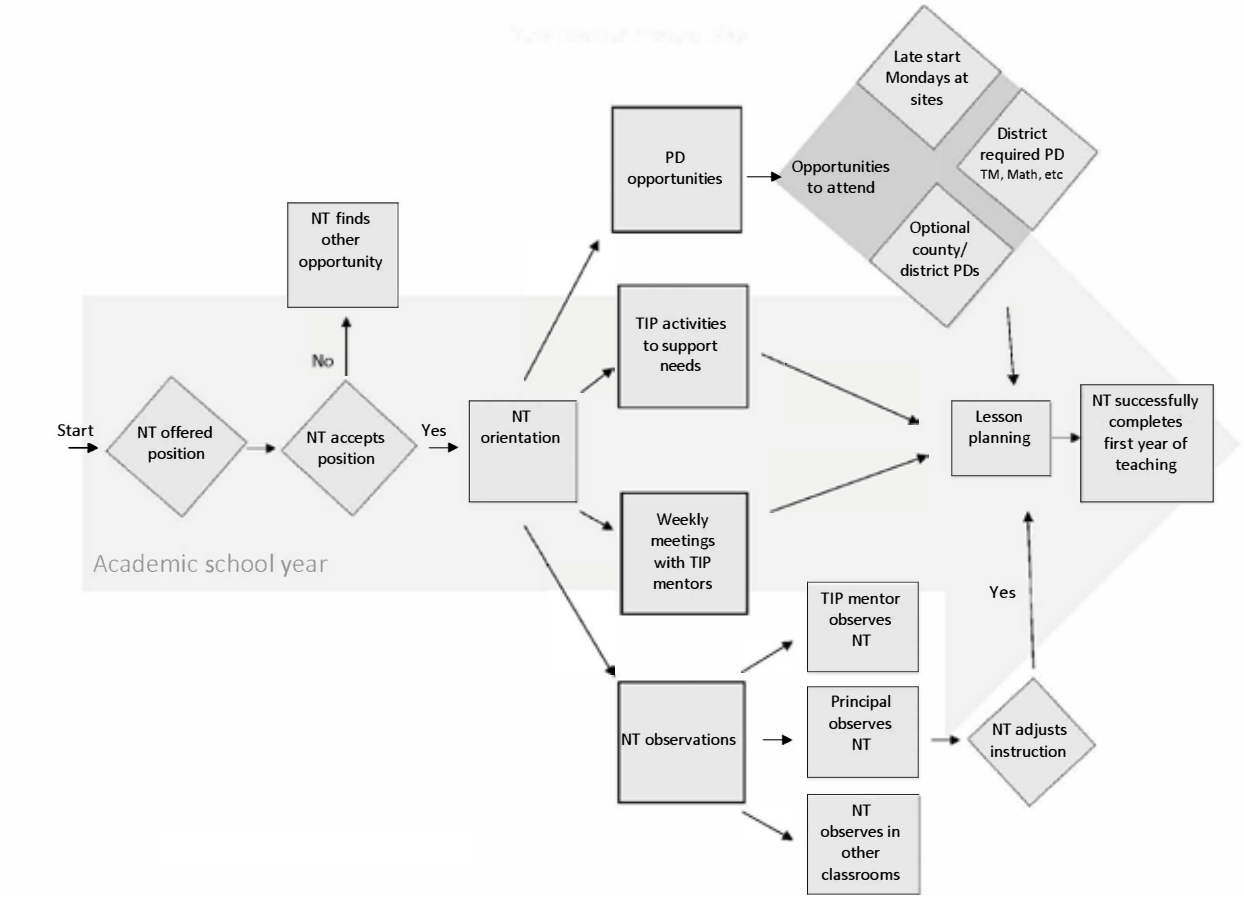


Figure 3: New Teacher Process Map

Twenty-five out of 43 new teachers initially expressed interest. The authors secured Human Subjects Institutional Review Board (HSIRB approval for this study and obtained informed consent from all participants. No participants dropped out of the study; however, not all surveys were completed if a participant did not attend the NTLC session when the survey was administered.

The team developed a tentative plan for the 2018/2019 NTLC. The district and university incentivized participation; new teachers could timesheet their hours or receive salary credit from the district, and the university provided $250 for attendance at four of the six sessions. The NTLC included the following:

- One-hour sessions every other month that included community building, teacher-driven content supported by faculty expertise, and exploration of problems of practice
- Informal check-ins with new teachers in between sessions
- Online Google site support
- Co-teaching opportunities with teacher preparation faculty
- Social activities

All NTLC sessions were jointly planned and implemented by district and university personnel, and learnings from PDSAs—grounded in both process and outcome measures—informed iterative changes to NTLC components.

This article reports on the system learning that occurred around the secondary driver, engaging in reflective thinking in order to address common issues. In the two NTLC sessions focusing on reflective thinking, the authors operationalized this as problem solving by engaging participants in a PoP—an inquiry-based protocol where teachers identified a problem and group members shared interpretations and solutions. The team conducted PDSAs during NTLC sessions two and four examining participation in the PoP and the extent to which teachers elaborated upon the problem and provided solutions.

In advance of session two, participants were surveyed regarding the session focus, and the topic of parent communication was selected. At the session, each teacher completed a quick write identifying a parent communication challenge. Some examples included parent/teacher language barriers and coordinating with parents to collaboratively support student learning. One participant from each table volunteered to share a problem with their group, engaging in a structured protocol (see Figure 4), which covered presentation of problem, response to problem, group collaborative inquiry, possible next steps, and presenter response. Time increments were allocated and the participant presented the problem and gave a response. Problems identified aligned with three primary themes: eliciting parent support, forming relationships with parents, and communication barriers.

## Study of the Intervention

One key tenet of continuous improvement is to better understand the system as a whole in order to fully comprehend the production of particular outcomes (Bryk, Gomez, Grunow, & LeMahieu, 2015). The improvement team used PDSA cycles to study the manner in which any changes positively or negatively contributed to desired process outcomes. The team also administered an outcome measure at three points to measure growth across the main constructs (belonging, communication and problem solving). PDSAs were used to evaluate change ideas (e.g., establishing NTLC community norms, liaison check-ins with new teachers, co-teaching with university faculty) including informing next steps and changes for subsequent NTLC sessions. Nine PDSA cycles were conducted around five key components of the NTLC community: NTLC sessions, new teacher check-ins, co-teaching opportunities, NTLC Google site, and a district awareness survey. A common form (Grunhow, Park, & Bennett, 2018) drove PDSA cycles conducted by all improvement team members. The team rotated leadership of the PDSA cycles and jointly set goals and predictions for each cycle. PDSA data was analyzed on a monthly basis to plan next steps for the community.

### *Process Measures*

To measure new teacher attendance and participation, the team maintained a spreadsheet documenting NTLC participation. Participation was recorded for face-to-face sessions, online discussion forums, co-teaching opportunities, check-ins, etc. for each participant, enabling the team to track participation within and across NTLC components. The spreadsheet was examined during team huddles to identify dips and spikes in participation, make predictions about why these occurred, and collect additional data to test predictions.

At five of the six NTLC sessions, the team administered a satisfaction survey to capture participant perspective on the session. The survey varied slightly based on content provided in each session, but four questions remained consistent in order for changes to be tracked over time (e.g., The NTLC is a supportive space for new teachers). Responses to these four questions were averaged, and averages were compared across the timeline distribution with special attention paid to averages that significantly increased or decreased. This data drove the content and activity for the subsequent session. For example, a survey was given to participants with a choice of four topics of interest to new teachers. Results from this survey determined the content for the subsequent NTLC session. Satisfaction surveys given after sessions two and four included questions specific to the problem of practice activity.

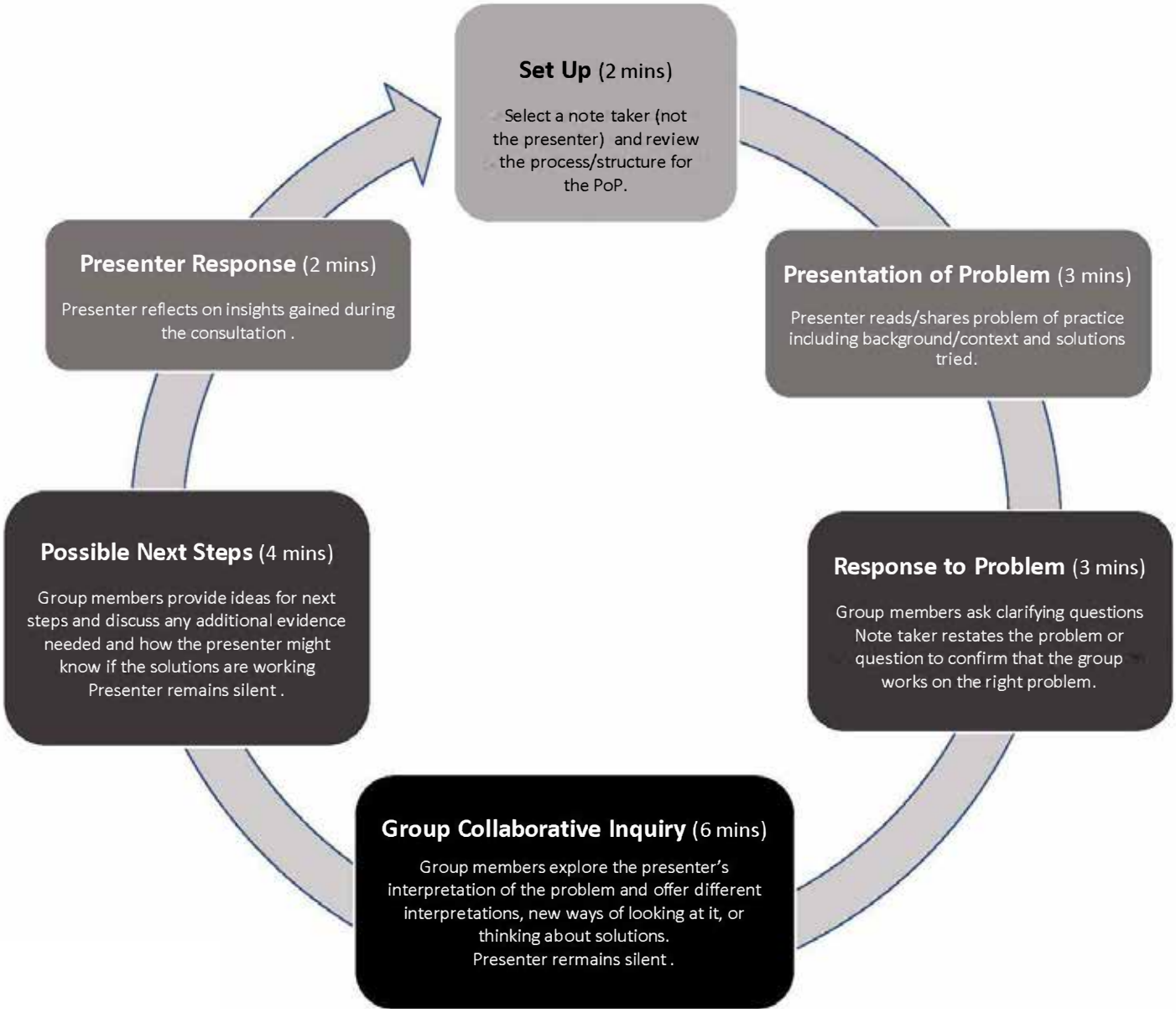


**Figure 4: Problem of Practice (PoP) An Adapted Inquiry Protocol**

### *Outcome Measures*

A new teacher survey measuring key constructs—belonging, communication skills, and problem-solving ability—was inspired by work in the Building a Teaching Effectiveness Network (BTEN) (Takahashi, Bryk, Hausman, & Yamada, 2015). The survey included 15 questions on a five-point Likert scale with five questions for each construct (e.g., Experienced teachers make new teachers feel welcome here). New teachers completed the same survey at the end of sessions one, three, and six. Analysis of the new teacher survey included responses grouped by the associated key construct and compared within that grouping of questions for beginning and endpoint distributions. Those teachers who attended both sessions one and six and who completed all 15 survey questions were included. This comparison analysis was possible for a subset of nine of the 21 participants or 43 percent of participants.

The team conducted semi-structured interviews post-intervention to better understand participant experience (n=13). Team members jointly created the interview protocol, and the questions addressed the efficacy of the various components of the NTLC.

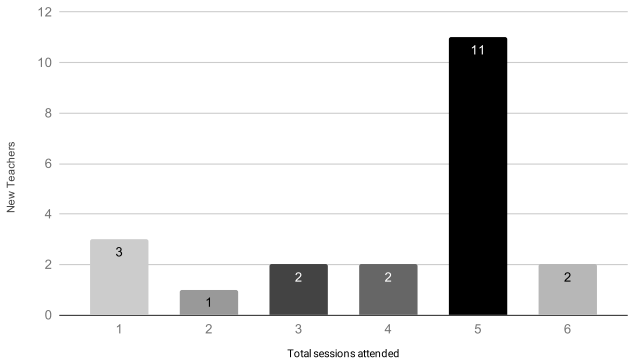


**Figure 5: New Teacher Attendance**

Interviews were transcribed and coded thematically using themes in a priori survey questions (e.g., problem- solving abilities).

## Results

Attendance at the six sessions varied with a range of 11-18 participants per session (See Figure 5). The average attendance for the six sessions was 14. In all, 21 distinct teachers participated.

A PDSA on the implementation of the PoP protocol to impact new teachers' problem- solving abilities was conducted, and fieldnotes revealed that during the PoP, all new teachers asked clarifying questions of the presenter and provided suggestions. For example, one participant shared a problem concerning a student exhibiting severe behaviors in the classroom. The participant noted that student behavior was reinforced by the parents. Following the inquiry protocol the group listened, asked clarifying questions, and finally offered suggestions to address the problem including creating a cohesive front between all teachers instructing this student and inviting student services personnel observe the classroom dynamic. At the conclusion of the PoP activity, participants were asked to complete a satisfaction survey. The satisfaction survey revealed that all 11 teachers felt comfortable participating during the PoP, with three giving the PoP a five out of six, and seven giving the PoP a six out of six in terms of their level of satisfaction. In the open-ended response question, all 13 teachers identified the PoP as the highlight of session two, with one teacher even noting: "I might find a way to use this in class."

On the satisfaction survey for NTLC two, one teacher recommended allocating more time in a future session to enable greater exploration of problems. Therefore, the team revised the session four PoP, allowing for more time and for all teachers to share their individual problem by adjusting the structure of the PoP to be more open-ended as follow: presentation of problem, interpretations, and next steps. For example, for the first phase of the protocol, a new teacher presented the problem of a high school student showing disengagement in class and not submitting assignments. After posing this problem, the new teachers in the group explored possible interpretations of this problem, identifying what might be causing the student apathy. Based on these interpretations, the group proposed tangible next steps on how to increase this student's engagement and submission of assignments. Although there was a provided time increment for the discussion of each problem, groups decided how much time they spent on each component of the protocol. In addition, presenters could speak throughout the entire protocol, not just at the beginning and end. Satisfaction surveys from session four revealed that all 15 of the teachers in attendance gave a six out of six on their level of comfort participating, an increase from session two. Open-ended responses to the satisfaction survey again mentioned the PoP as the highlight of the session, with one teacher stating, "having the freedom to work on what we need as individuals" was a beneficial change. Less structure to the PoP also created better dialogue and more authentic conversation.

Outcome data (e.g., new teacher survey) for nine teachers who attended both sessions one and six showed growth in confidence around key constructs over the course of the year. Teacher responses to five survey questions around the key construct of problem solving indicated that confidence levels increased for two of the five questions and dropped slightly for three of the questions (see Figure 6). For Q1:I look ahead and try to prevent problems before they happen, teachers reported an average confidence of 3.3, (scale of 1-5) an average that increased to 3.9 at post distribution. Similarly, when asked to respond to the statement Q2: I look at a problem from many different viewpoints (e.g., my own students, principals and parents), average teacher confidence levels increased slightly from 3.4 at pre-distribution to 3.7 at post. The authors hypothesize that the decrease in growth for three of the five survey questions is tied to a lack of follow up on new teacher implementation of cogenerated solutions during PoP. The PoP inquiry helped teachers to identify problems and possible solutions, but the application of any new solutions in their school context occurred only after the sessions. Although a limitation of the study, the team focused more on collaborative, face-to-face problem solving rather than long-term implementation solutions.

Interview data overwhelmingly revealed that teachers valued the collaborative approach to problem solving real-life classroom issues, and many stated that this practice was one of the most valued aspects of the NTLC sessions. When asked how the NTLC sessions impacted their ability to problem solve, one teacher commented "...sometimes it's just nice to get a fresh set of eyes...to help problem solve. I definitely felt that part was really

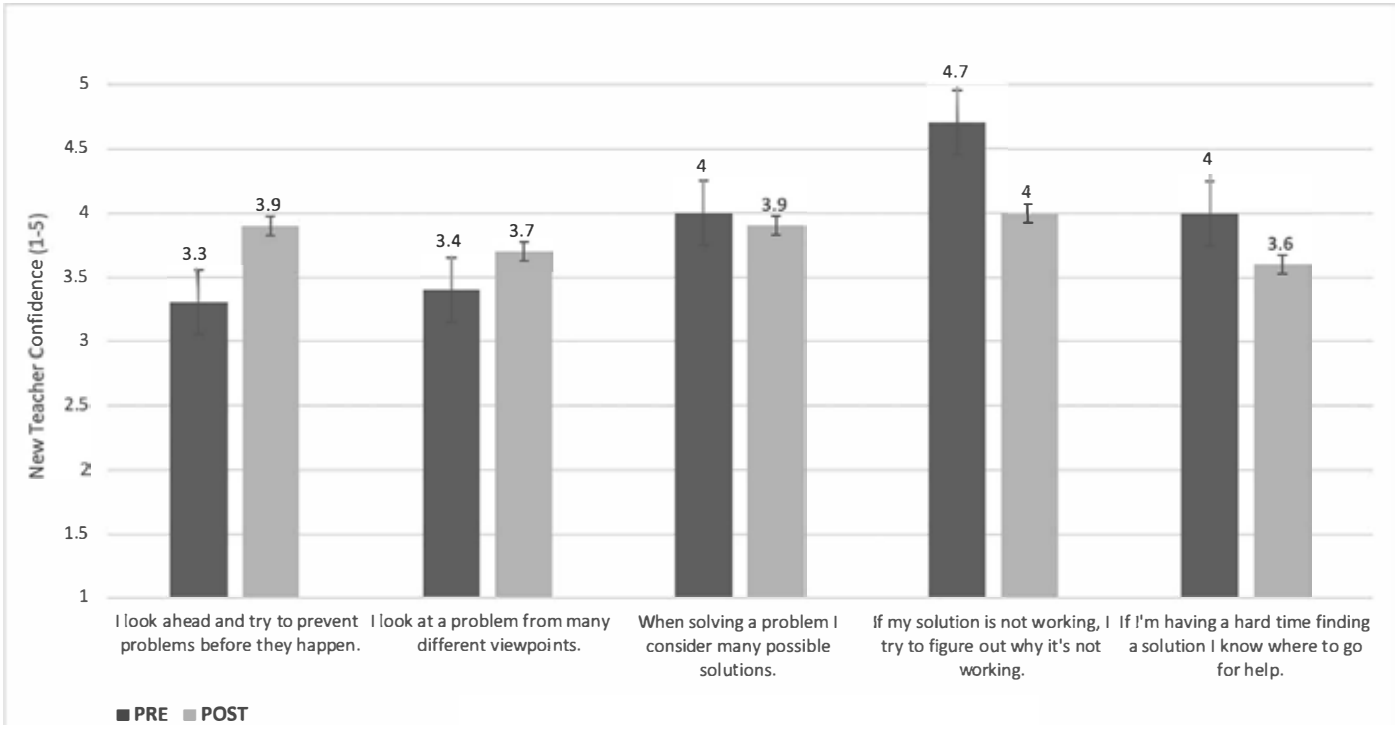


**Figure 6: New Teacher Confidence/Efficacy-Problem Solving**

beneficial, and then taking what they said, and applying it to my class...it gave me a different perspective of how to approach some problems" (Interview Participant 10). A second teacher concurred and appreciated the co-generation of solutions "A lot of times when I'm by myself trying to figure something out, I get stuck in my own ways, but hearing other teachers share their ideas was pretty helpful" (Interview Participant 12).

The PoP protocol helped create an environment whereby experiencing challenges was perceived as a norm enabling teachers to speak freely. Many spoke of how this practice gave them immediate ideas to implement or practical knowledge for the future. One teacher stated, "We had to pick one challenging student or a challenging moment...I implemented it in my classroom, and it was really great. That student has really improved, and I attribute a lot of that to working with my peers...in figuring out a solution together...the collaboration was extremely helpful" (Interview Participant 2).

## Discussion

First, overall data show the NTLC encouraged new teachers to engage in reflective thinking to address common issues. The authors hypothesize that the iterative nature of the work largely contributed to the five major learnings in this study. The four PDSA cycles conducted on each of the sessions allowed the data to drive the content and delivery for the community. As previously mentioned, participants frequently suggested topics of focus or amendments to activities for subsequent sessions. The iterative nature of the PDSAs allowed for quick, small changes to be made in response to patterns in data. Some changes were logistical, including changing the start time of the sessions and switching the day of the week. Other amendments were more process oriented, including the decision to keep or replace interactive activities in sessions based on observable engagement by teachers. Similar to research on teacher learning communities (Attard, 2007; Boone, 2010; Westheimer, 2008), this feedback loop allowed the participants to drive the learning, which likely encouraged sustained attendance and learning over time (Vescio et al., 2008, p. 86).

Second, new teachers frequently referred to all of the unforeseen issues that came up throughout their first year of teaching (e.g., geographic location of classroom impacting collaboration opportunities with veteran teachers, systems for managing paperwork, and the importance of self-care). A focus on problem solving and reflective thinking enabled teachers to apply deliberate processes allowing them to tackle these unforeseeable problems. Additionally, responsively choosing problems generated from the group made the experience authentic for teachers. If participants feel safe, this creates the most space for teachers to

advance their practice by allowing them to "distance themselves from their current ideas and take new perspectives" (Brodie, 2014, p. 236).

Third, through sharing common problems, new teachers stated that they felt connected to others, thereby fostering a sense of community whereby they felt comfortable engaging with one another around difficult questions. Satisfaction surveys given at the end of each session and final interview data speak to participants' high comfort level with sharing. One teacher commented:

> "I'm a special education teacher, and at times, that is very isolating. You don't have the team partners that you have in teaching general education, but going to the sessions I could see the people that I graduated from [the university] with and that are in the same districts and teaching and [who] understand the same things that I am going through, so in a way that was like my grade-level team." (Interview Participant 4)

As members of the learning community, new teachers were asked to share their practice in public ways. There is a collective accountability to the group whereby everyone is, in part, responsible for the learning that takes place for all (Hord, 1997; Webb et al., 2009) and that this very vulnerability encourages building relationships and community.

Fourth, sharing with each other encouraged teachers to explore a common issue more deeply and to see it from different perspectives. By doing this work in community, they were able to learn from each other's perspectives and, in some cases, have their own views challenged in safe and productive ways. Attard (2012) found reflective writing on personal issues of importance, combined with collaborative reflection on those issues, allowed participants in a researcher-created teacher community to benefit professionally. Collaborative reflection on problems of practice allowed for collective knowledge construction via question posing and exposure to the ideas of others (Attard, 2007; Nissila, 2005; Orland-Barak, 2006; Zellermayer & Tabak, 2006). Access to alternative perspectives from the larger community is also seen as key to maintaining an invigorating and diverse teacher community (Katz, Kaplan, & Gueta, 2009).

Lastly, data reveal that participants were engaged in the learning environment. Attendance at NTLC sessions was consistent throughout the year. In fact, 11 of the 21 total attendees participated in five of the six sessions although they only needed to attend four sessions to receive the participatory stipend. The voluntary participation of a significant group of attendees demonstrates that attending the sessions was a positive experience. One teacher stated, "I enjoy attending the sessions. I never felt like they weren't helpful at all" (Interview Participant 12). While new teachers lead extremely busy and full lives, they carved out an hour of their time to attend these meetings. By continually focusing on the needs of the teachers and being responsive to their feedback, the NTLC promoted an engaged community willing to immerse itself in solution-oriented practice.

The team had limited access to new teachers who did not participate in the NTLC, so there is insufficient data to apprise the team about why these individuals chose not to participate. In addition, the team was not aware of the manner in which their non-participation did/did not affect their sense of belonging and ability to problem solve and communicate.

## Limitations of the Study

One limitation of this work is the lack of ability to generalize due to the limited number of participants and voluntary nature of participation. As new teachers were not mandated to attend, this limited the number of participants who attended individual sessions and were present for data collection. A second limitation was the lack of follow-up after new teachers engaged in the PoP to see what recommended next steps were implemented by the new teachers and the impact on addressing the identified problems. Finally, the team was unable to determine why new teachers chose not to participate in the NTLC opportunity as we were unable to query those who declined to participate.

## Recommendations for Future Research

The team is interested in continuing this research in future iterations of the NTLC. One focus for future research includes involving non-participants in data collection as a comparative study to further illustrate the value of the NTLC. Additionally, further work to better understand why new teachers opted to not participate could potentially make the community more desirable. Also, as mentioned there were instances in this work where following outcomes (e.g., the success rate of implementing suggestions for the PoP or long-term retention rates of teachers) would be very valuable for future learning. Lastly, the authors identified multiple variables that contribute to teacher retention in the fishbone diagram. Future work could explore these other factors that lead to attrition, such as school climate or administrative support.

## Conclusions

The iterative, data-driven continuous improvement focus of the work enabled the team to develop a community that prioritized new teacher belonging and development of problem- solving skills to support the transition from teacher preparation to the first year of teaching. Current induction systems mostly provide

new teachers with an individual mentor who works one-on-one with the early career teacher. This, in some ways, continues to perpetuate a more isolated model of induction and does not introduce and immerse the novice with fellow new teachers. The NTLC described in this study provided early career teachers with the opportunity to join a cohort (a community), thereby remedying this issue of isolation and contributing to a sense of belonging.

In addition, teacher preparation programs are uniquely positioned to facilitate an NTLC. New teachers desire to explore and problem solve a variety of issues, especially those likely difficult to admit to their school site principal or an assigned induction mentor. The NTLC, composed of a small group of peers experiencing similar issues and trusted teacher-preparation mentors, provides a unique space for new teachers to express vulnerability and leave equipped to address challenges.

On a pragmatic level, the NTLC was effective in supporting graduates of the teacher preparation program as well as leading to subsequent program reform. Teacher preparation programs are short and often impacted with standards that have to be taught, making it nearly impossible to prepare a new teacher for everything they will encounter in their first year of teaching. The NTLC provided the teacher preparation program with an additional year to remain connected with its graduates and continue to provide mentoring. Furthermore, implementing and researching the NTLC informed teacher-preparation faculty about the importance of developing problem-solving skills while pre-service teachers are enrolled in their training program, thus impacts future revisions to the teacher preparation program.

Finally, the application of improvement science allowed for a responsive, learner-focused process, an essential component of the community's success. New teachers in the community felt valued and heard, allowing their feedback and needs to guide the content and structure of NTLC sessions. Without the application of improvement science, the focus on the user could have been lost or minimized, resulting in less personalized learning.

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Data use practices in the continuous assessment and evaluation of educator preparation programs

# An Approach to Building Capacity for Data-Driven Continuous Improvement in California State University Educator Preparation Programs

*Virginia A. Simon, Sarah Kolbe, and Paul Tuss*

***Abstract***

Educator preparation programs (EPPs) need to ensure that all students have access to effective teachers by using data more strategically to foster improvement. Although many EPPs are committed to improving program outcomes, they often do not use available data to inform their improvement efforts or utilize continuous improvement structures and routines.

The California State University (CSU) Educator Quality Center, which serves CSU EPPs, seeks to address these gaps by providing tools and coaching to build improvement capacity. This article describes a year-long effort to investigate EPP data-use practices using an improvement science approach. Examining the roles, routines, and experiences of users gave the EdQ team insight into the conditions that encourage or impede strategic data use and created an opportunity to test promising supports. Three CSU EPPs received structured coaching and facilitation along with resources that helped leaders and teams build trust, consensus, and energy around improvement efforts. This article shares initial findings regarding approaches in these three settings with potential for broader testing and scaling in the future.

***Keywords***

Data Management, Teacher Training, Curriculum Improvement, Improvement Science

## Introduction

The last two decades have ushered in a unique era of accountability for education in the United States (Cochran-Smith et al., 2018). One significant outcome of this accountability era was the creation and expansion of data and assessment systems to measure the effectiveness of teacher preparation programs and the teachers they are preparing. As educator preparation programs (EPPs) have moved to build data systems that comply with new forms of assessment and accreditation, campus resources, habits, and routines around data use have been implemented through an accountability lens. Data collection and use for external accountability are frequently viewed as incompatible with internally motivated data use for improvement by both teacher education practitioners and external audiences (Bullough, Clark & Patterson, 2003). Individual knowledge, beliefs, and assumptions play a major role in how data are interpreted and used in educational settings (Coburn, 2001; Coburn, Toure & Yamashita, 2009; Coburn & Turner, 2011). The too-frequent use of data as a tool for punishment rather than as a resource for learning and improvement has created a defensive stance toward data and eroded trust (Ingram, Louis, & Schroeder, 2004). Furthermore, the available data tend to be aligned to a theory of action that emphasizes aggregate outcomes in performance rather than a more fine-grained view that shows variation, prompting inquiry rather than judgement (Weinstein & Anderson, 2019). This is a tension that is not easily reconciled.

This article describes how the team at the Educator Quality Center (EdQ) is using improvement science, an organizational management approach to problem solving that prioritizes developing, adapting, and implementing reliable processes (Langley et al., 2009;

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Bryk, Gomez, Grunow, & LeMahieu, 2015; Dolle et al., 2018), to better understand data use across CSU's EPPs and to test new ways of engaging with EPPs to nurture a culture of data-informed improvement. As part of the CSU Chancellor's Office, EdQ has a unique opportunity to target resources and support to each of the 23 CSU credentialing entities. Its mission is to support CSU EPPs by providing system-wide data, evaluation services, and coaching for continuous improvement.

Since 2014, EdQ has worked to expand its operational scope to more comprehensively address the data needs of EPPs. To meet the demand for access to system-wide and campus-level data, it created a data warehouse to integrate siloed EPP data and launched a dashboard reporting system. The first program-perceptions dashboard was released in December 2017 to help CSU EPPs access information on the current needs and perceptions of program completers, new teachers, and their employers regarding the effectiveness of our programs. The dashboard significantly democratized data access, increasing the number of EPP stakeholders able to review the data from less than two dozen to more than 1,000.

While this was an important first step, research demonstrates that simply providing data is not sufficient to ensure its strategic use for improvement (Bryk et al., 2015; Deans for Impact 2019). For example, studies have highlighted collaboration as an additional, critical driver to improvement. A study by Peck and McDonald (2013) of three EPPs found that cross-department, collaborative data conversations that included faculty were critical to faculty-driven improvements in individual programs. Multiple studies have diagnosed that a lack of time to collaborate and a lack of structured routines significantly impedes data use, regardless of data availability (Coburn, 2001; Ingram, Louis, & Schroeder 2004; Means, Padilla, & Gallagher, 2010; Wayman & Stringfield, 2006). Another study found that even when data use for improvement is valued, using intentional collaboration to build understanding and coherence around improvement efforts still requires mindset and organizational shifts (Boudett & City, 2013).

To effectively support campuses, EdQ changed its organizational structure to shift from a data-delivery organization to a delivery and improvement organization. In 2017, they created a data coach position to support effective data use by training end users of the dashboard. Despite the access, exposure, and training provided throughout a one-year period, early monitoring of dashboard usage revealed that while the dashboards were well-received in user testing, only a small number of campuses had more than one or two regular, engaged users. Among those regular users, data analysts and leaders were overrepresented and faculty were underrepresented. EdQ wanted to understand why this was the case. For example, there was no information regarding what collaboration—if any—was occurring around the data. More broadly, EdQ wanted to know how all data sources were being utilized to inform improvement.

## Understanding the Problem

The team, comprised of a data coach, a data scientist, and the director, began to closely study the feedback and uptake of new users of the EdQ DataView dashboard. They also sought reactions from end users through formal evaluations at their trainings, as well as informal conversations. It quickly became apparent that CSU educator preparation programs are awash in data, not only from EdQ but also their own campus systems, state agencies, and external partners. Furthermore, EdQ learned that the educator preparation community struggles to access, interpret, and regularly use data in strategic ways to improve program outcomes. This discovery is consistent with the findings of a 2011 national study by the Wabash College Center of Inquiry (Blaich & Wise 2011). That study set out to produce comprehensive longitudinal data and measures to provide higher education leaders with data to improve student experiences and outcomes. The design of the study was influenced by three assumptions: a lack of availability of high-quality data was the primary deterrent to strategic data use; providing detailed reports of quality data would spur action; and faculty would engage with the reports in effective ways. At the completion of the project, researchers were surprised to learn that only about 25 percent of the 19 institutions studied engaged in an active response to the data produced and that most circulated data for a short time, with no concrete action or inquiry. This supports prior research on analytics in higher education that found that data use at most institutions was limited to reporting, rather than action, even when a broad range of data was supplied (Bichsel, 2012). The problem was not availability of data, but a gap between access to and utilization of data for improvement of programs and services. The EdQ team chose to focus its improvement efforts on addressing this gap.

## Methods

In improvement science, all steps are centered around three essential questions:

- What specifically are we trying to accomplish?
- What changes might we introduce and why?
- How will we know that those changes are an improvement? (Bryk et al., 2015).

This 12-month project was organized in phases, reflecting this improvement science approach to clarify and understand the problem and its place in the system (Phase 1), develop a working theory of improvement (Phase 2), and then to test change ideas in rapid iterative cycles (Phase 3). Data are collected during each phase. An Institutional Review Board (IRB) application was not required for this project because it did not involve human subjects. The focus was on institutional program and process quality.

## Phase 1: Understanding the Problem and the System that Produces It

To explore the causes of a lack of engagement in data use for improvement in CSU EPPs, EdQ conducted a root cause analysis, which clarifies the system of potential causes of a given problem (Bryk et al., 2015) using a fishbone diagram, then highlighting areas where EdQ had some leverage to effect change.

Six broad potential reasons emerged:

1. The organization's culture of data use is focused on accountability rather than improvement,
2. Lack of awareness of available data,
3. Data are not seen as useful or relevant,
4. Data systems are not user-friendly or intuitive,
5. Data quality or lack of trust in the data, and
6. Misconceptions about how data will be used.

Utilizing existing relationships with EPP leaders and assessment coordinators, the EdQ team conducted a series of data collection activities with an initial set of volunteers to test these potential reasons for a lack of engagement in data use. The team visited one campus to shadow its annual data-review process, and conducted empathy interviews—an interview approach to learn about the experience and feelings of users (Plattner, Meinel, & Lefier, 2014)—to understand what it is like for faculty and staff to use data on the campus. They analyzed the roles of dashboard users to understand how responsibilities for using data are distributed among faculty, leadership, analysts, and other staff members. Team members also met with the deans of education collectively and completed a simplified current state/gap analysis with them about their data-use practices and followed up at a second meeting with a basic root cause analysis to help them and the team, understand the barriers to data use for improvement in their settings.

### *Phase 1 Findings*

From interviews with leaders, EdQ learned that many faculty and staff have a compliance mindset. One leader reported, "We used to get those big PDF reports from EdQ and we used to have to write a report to our president explaining why the numbers aren't as good, or the 'n' size is low. It was not helpful, just a scary thing."

They also found variability across campuses in the level of trust faculty have in the data. As one participant stated, "Their first instinct is to discount data—that's not in-house [data], these aren't our questions." An individual from another campus shared a similar observation. "One of my experiences in data meetings is that we spend more time talking about the integrity, validity of the data than talking about how the data can inform our processes."

In empathy interviews with assessment coordinators, EdQ learned that these staff are often excluded from improvement work and viewed as primarily responsible for compliance reporting. They are frequently asked to provide data without being included in context discussions or follow-up work, which causes them to feel isolated and disconnected from improvement activities. One assessment coordinator shared that, "There's no formal routine for data meetings. They ask, I do. There are scheduled things that are part of my job—running surveys, producing reports." Another shared, "Sometimes I go home at night and think, I really hope they're using this [data analysis] for something… I do wonder what they're doing with it."

## Phase 2: Developing a Working Theory of Improvement

Using the learnings from Phase 1 investigations, the team developed a theory of improvement to begin to focus on what changes might be effective. They determined that potential leverage—or opportunities for high-impact change—existed within three areas. These areas are called primary drivers and are illustrated in Figure 1:

1. Developing leadership capacity to conduct data conversations that promote trust and active engagement of stakeholders;
2. Supporting campus-level routines for regular, collaborative examining of data and testing of solutions; and
3. Establishing system-wide data and visualizations.

In improvement science, the development and testing of changes can take many months. The iterative nature of the data collection and the learning in this phase mean that multiple leverage areas may be examined and multiple changes may be tested simultaneously. For the purposes of this report, the primary testing described relates to the expansion of EdQ's key role from being an organization that supports EPPs by providing data, to one that partners actively with EPPs to utilize the data to inform

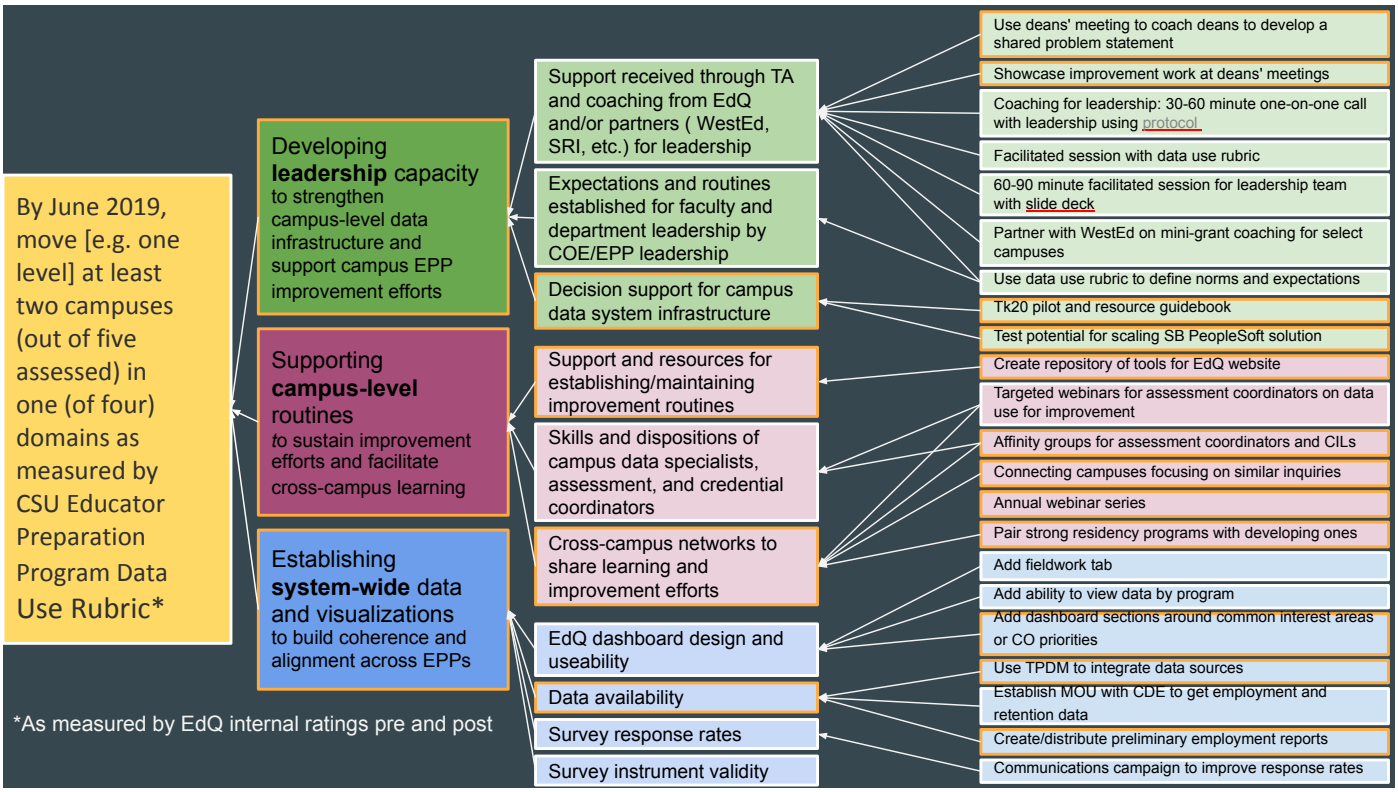


**Figure 1: EdQ Theory of Improvement**

improvement efforts. Specifically, this report focuses on the new role and activities of the EdQ Data Coach to support leverage areas 1 and 2.

### *Phase 2 Findings*

Since Phase 2 constitutes the development of a theory, which provides a structure for moving forward into Phase 3, there are no findings produced in this phase.

## Phase 3: Developing and Testing Change Ideas and Interventions

Before any interventions could be considered for testing, the team at EdQ needed to define specific high-quality data-use practices and a way to measure their impact. They drew on a resource used in other parts of the United States called the Deans for Impact Data Diagnostic Tool©(2018). The tool is designed to aid teacher-preparation program leaders in assessing the quality of their data-use practices in a collaborative setting. It is a rubric that consists of four domains, each with four to five sub-domains and two to six elements. Each domain can be assessed at a developmental level of "Not Yet Started," "Emerging," "Developing," or "Sustaining." To simplify the instrument and focus more directly on the goals of EdQ's project, the rubric was adapted to examine the following domains with no sub-categories:

1. Establishing an inquiry orientation toward the practice of data use,
2. High quality data made available and accessible,
3. Planned and structured collaborative reviews, and
4. Repeated cycles for continuous improvement.

The rubric was used as an internal instrument to establish a baseline measure in cases where the team had engaged more than once with a particular leader or group. It was then used as an outcome measure, showing the progress of campuses that received continuous support from EdQ. It was also considered a potential support tool that might prove as a useful way of engaging campuses in an on-going relationship with EdQ. The aim was to partner with at least two campuses to improve their data use by one level on the rubric within one of these domains by the end of the project.

The team first prototyped multiple protocols for campuses to use the rubric either on their own or facilitated by EdQ as a way to improve data use. They conducted three Plan-Do-Study-Act

(PDSA) cycles to iterate the prototypes with volunteer campus leaders and improvement science experts, gathering feedback through interviews. They learned that the rubric tool was generally positively received as a prototype, but there were mixed opinions about its utility as an exercise for campus groups.

To find out more, EdQ tested a process for facilitating the use of the tool with a campus group. One campus volunteered to host a rubric session with its assessment committee facilitated by EdQ's data coach. This event was revealing. It showed siloed practices by individual programs, disconnected from a larger strategic plan for the school of education or the university. EdQ's data coach was invited to return to conduct another session with an expanded group that included faculty program chairs. This group was able to provide more information to the assessment committee about data collection happening within credential programs, surfacing the need to create a more coordinated and cross-departmental system of data collaboration aligned to EPP goals. It also revealed a faculty who tend to view data as an instrument for accountability rather than an instrument for improvement. This developed into a long-term coaching relationship with the dean and associate dean in the months that followed to work toward a coordinated EPP-wide improvement focus.

Being able to deliver support in a virtual setting was an important test for EdQ's small team in order to effectively and efficiently support 23 campuses across the system. In parallel work, EdQ tested individual leadership coaching and group facilitation supports via the Zoom video-conferencing platform. In order to have a larger sample size for studying the effectiveness of virtual supports, these tests included campus groups and leaders beyond the campuses at the focus of this study.

The first PDSA was conducted to test a virtual group-facilitation approach. Sixty-minute sessions were designed to take groups through guided data digs of the DataView dashboard and introduce concepts and tools for supporting mindset shifts (Domain 1) such as the "ladder of inference" (Senge, 2000; Argyris & Schön, 1974). Data digs showed participants how to look for variation in the data rather than average performance in order to focus their inquiry and choose a problem focus that could lead to an improvement cycle (Domain 4) (Bryk et. al., 2015). The typical group that was gathered by leaders for this session was an assessment committee, task force, or a department chairs group. Leaders were asked to meet with the data coach prior to each session to provide background and context about EPP goals and data-use practices.

Another PDSA was conducted for one-on-one coaching approaches. A coaching protocol was tested to help leaders examine current structures and routines around data conversations, evaluating the type of data viewed, the frequency it is viewed, who views it, and for what purpose (Domain 3). (Sample protocols can be found in this Appendix.)

### *Phase 3 Findings*

Data collected during PDSAs included surveys of participants to determine perceived value and relevance of activities to improvement efforts and to assess the value of tools being used. Debriefing sessions were held with leaders to triangulate survey responses and get additional feedback. Detailed notes were kept during each conversation. Leaders were also asked if they would like to receive on-going support from EdQ to find an improvement focus and begin a continuous improvement process with the help of the data coach. Notes were coded to determine leading indicators of progress on the rubric. All coaching and facilitation with campuses was tracked to document the frequency and type of support given. EdQ looked for repeat invitations as a proxy for interest in an ongoing partnership. In all but three cases, they found that the sessions, while perceived as valuable according to survey responses, did not lead to repeat invitations for continuous improvement work. In the three cases where repeat invitations were issued, EdQ was able to form a partnership for deeper, ongoing continuous improvement coaching with the leader and the groups they were convening. These three EPPs, which collectively serve more than 1,200 teacher candidates each year, became the primary sample of the study and are here forward described as Campuses A, B, and C. All three campuses are urban, majority-minority schools.

One theme that emerged across session evaluations was the lack of time. Sessions were typically limited to one hour. When participants were asked what they would change about the session, surveys consistently revealed that people wanted more time to explore their data. EdQ began to ask for 90-minute sessions, but this was not always provided.

## Results and Analysis

Testing of group and individual support approaches created an opportunity for EdQ to begin to work closely with three EPPs on improving data use for continuous improvement. The results of this early work with EdQs culminated in a total of 22 touch points between November 2018 and May 2019 with either the leader or a group convened by the leader. Two of these ongoing relationships were conducted in virtual settings. One, described earlier, began with an in-person session with the data-use rubric and evolved into a second in-person session and several virtual check-ins with

the leader. The others began with the DataView dashboard session. Following this study, ongoing support has been customized to meet the needs of each leader but generally involves moving a campus team toward focusing on an area of improvement identified in the data and beginning an investigation into root causes and potential areas to focus improvement efforts.

After eight months, EdQ made final designations on the data-use rubric as their outcome measure for the three partner campuses. These final rubric designations were based on structured interviews aligned to the rubric with leaders from the campuses. Two EdQ staff participated in the interviews and calibrated their ratings to arrive at a final determination of whether movement was made on the rubric.

Campuses B and C moved up one level in Domain 1, and campus C also moved up one level in Domain 3 as shown in Figure 2. In each case where improvement occurred, it was from the lowest rubric category (Not yet started) to the second lowest (Emerging). No campuses improved in Domain 4. Campus A did not improve in any domain.

Coaching notes collected throughout the course of the project were coded to identify leading indicators of potential shifts in order

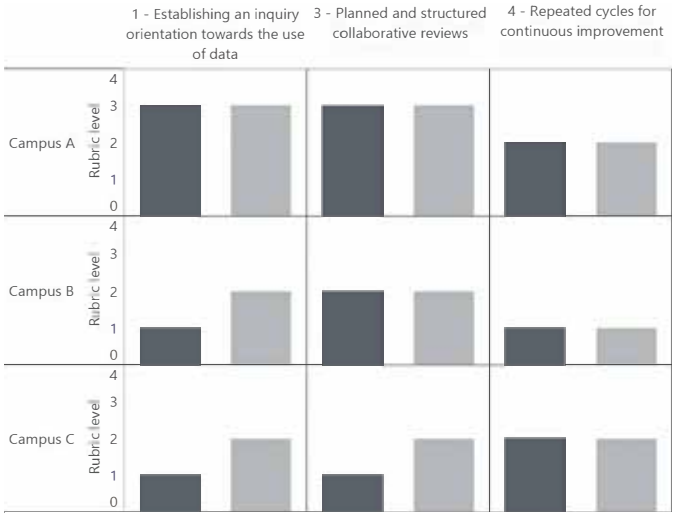


Figure 2: Domain

to better understand what events led to meaningful improvement on the rubric. Early evidence of change was most often visible in Domain 1, in the form of shifts in mindset as shown in Figure 3. As one associate dean said of their partnership with us, "It's helped me understand the importance of data. I never really paid attention to

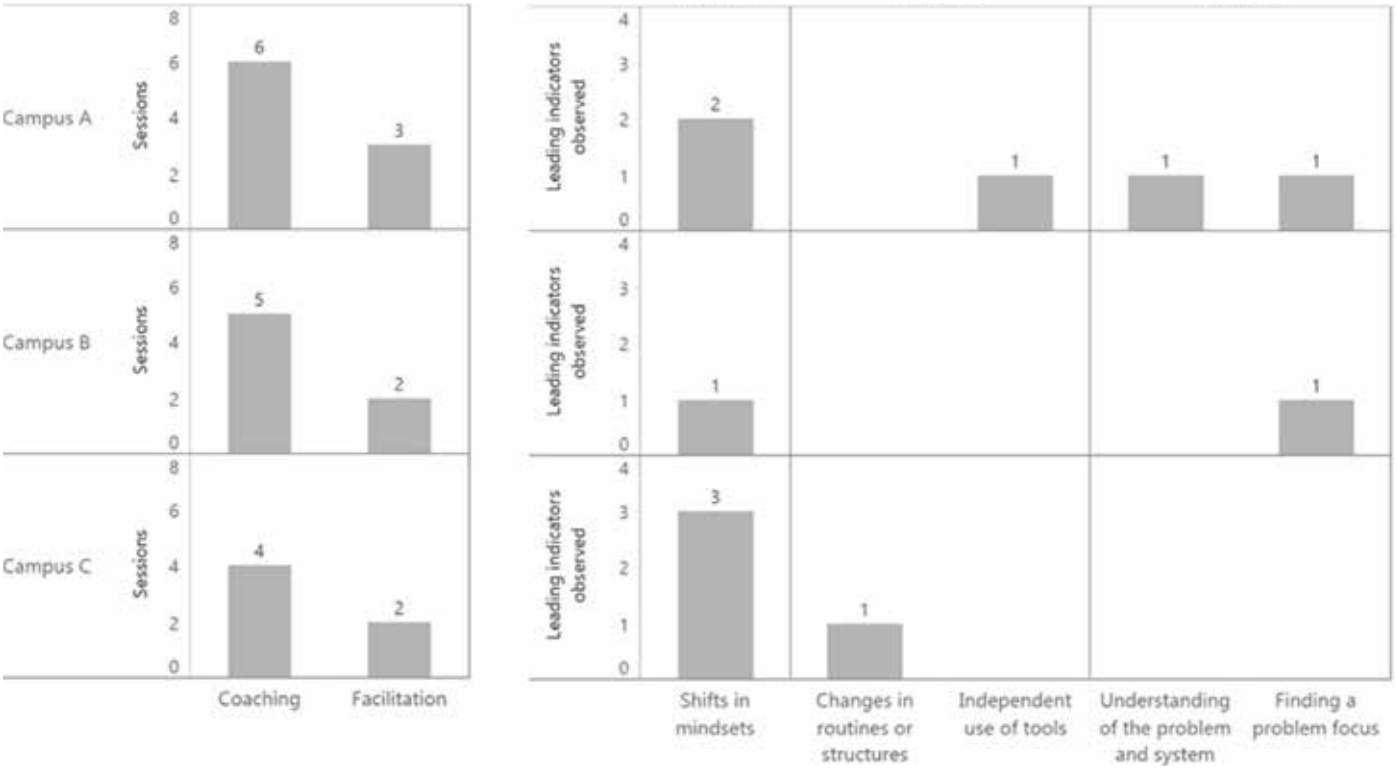


Figure 3: Leading Indicators

that in the past. I understand the importance of it and how it can be a catalyst for making change in my department."

## Discussion

In this study, intensive coaching and group facilitation by EdQ resulted in movement in two of the three campus partners from the lowest levels of the data-use rubric to the next level. These changes occurred in the categories of mindset shifts and collaborative structures, while no changes were noted in continuous improvement cycles. One conclusion that could be drawn from these results is that these foundational shifts are the easiest to make given the tools tested. Another conclusion is that they are a necessary precondition before actively engaging in an improvement cycle, and therefore making progress on this domain requires more time than the project provided.

This conclusion becomes clearer when considering the following: Campuses B and C had leaders who were new to their positions or new to their campuses. These leaders were eager to make changes in how data were used and how improvement practices were organized. It is no surprise, therefore, that this support paid off in the timespan studied.

Campus A had a leader who was more established and whose practices were already at the Developing level in domain 1 and Emerging in domains 3 and 4. This campus also received the most support (nine events). Where others were just beginning, campus A had already moved, and their task was to build structures to sustain new habits and engage more people. Moving from Developing practices to Sustaining requires more commitment over time and is perhaps the heavier lift for leaders and the system that supports them. New leaders, like those from campuses B and C, will need continued support to sustain the momentum gained. This raises issues for EdQ regarding its capacity to provide this level of coaching to a broader group of leaders in this situation in the future. In addition, with only three out of 11 campuses opting to engage on a deeper level, EdQ will be examining ways to pull more campuses into deeper work with the resources that we have.

While leadership capacity to build trust and guide the culture shift away from compliance and toward continuous improvement is key, systemic supports must be in place in order to sustain the work. Some leaders simply need new tools, processes, and vocabulary to begin. Others require more basic support in how to build consensus and energy around improvement efforts. Still others need structures that reorganize how time and talent are allocated. All of this takes time and focus. For EdQ, this means developing a strategic and differentiated approach to supporting leaders and groups as they use data to improve. Under consideration is the development of cross-campus networks in combination with individual coaching and facilitation support. In other words, EdQ would evolve into a hub for improvement networks focused on system-wide priorities. Additional investigations will examine the role of the assessment coordinator in improvement work and how EdQ can better support them.

## Limitations of the Study

There are limitations to this study that are important to acknowledge. Measuring culture shifts and changes in structures and routines during a nine- to 12-month period posed several challenges. Given the time constraint, the scope and sample were small and limited in the depth of detail they were able to capture from each campus. The virtual nature of most of the interactions should also be considered. Too few in-person sessions were held to robustly evaluate effectiveness of in-person versus virtual supports. The data-use rubric as a measure was also limited due to the time needed to demonstrate progress on the practices they were examining.

Overall, the concepts and tools of continuous improvement, used in an improvement science framework, were successful in making some essential foundational shifts in how data were used and interpreted in partner EPPs. Promising practices emerged for supporting these shifts, including developing leadership capacity by providing tools, processes, and vocabulary for building trust and consensus around improvement efforts. Approaches to making the more difficult shifts were harder to measure using the rubric employed. EdQ learned that their partnership makes a difference. All three EPPs expressed a desire to continue their partnership with EdQ. As one leader stated, "Now I feel like I have a partner in EdQ who doesn't care about what my score is right now, but about helping me along in the process to figure out how to improve."

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Employing the Danielson Observation Protocol, a rubric to enhance teacher preparation programs

# Fostering More Deliberate Practice in Teacher Preparation Programs: An Improvement Science Approach to Optimize Observation Feedback Conversations

*Brittney L. Beck, BreAnna Evans-Santiago, Holli Gonzalez, and April Davis*

***Abstract***

The meaning-making that occurs in dialogues between novice and more experienced teachers is critical in fostering habits of mind and instructional planning processes that translate reflection on teaching into deliberate practice. To better understand and ultimately improve the efficacy of feedback conversations among teacher candidates, mentor teachers, and university supervisors, we conducted empathy interviews, developed process maps, and implemented surveys. These data were then used to inform iterative adjustments to feedback conversations throughout the course of an academic year. Specifically, the researchers continuously revised the Danielson Observation Protocol to ensure the reflective conversations that occurred between teacher candidates and their mentor teachers and/or university supervisors led to deliberate changes in teaching practice. The methodological approach embodies the concepts of improvement science and reflects the use of rapid, iterative cycles of testing, learning, and scaling improvement. The outcomes of this work lend toward the enhancement of teachers' training and also serve as a conduit to the development of pedagogical expertise in curriculum development.

***Key Words:***

Teacher Education, Improvement Science, Mentor Teachers, Teacher Feedback, Danielson Observation Framework

## Introduction

Cycles of practice, feedback, and reflection are central to pre-service teacher preparation. However, delivering effective feedback to teacher candidates is a complex process, shaped by contextual and interpersonal factors. As Brandt (2008) argues, the feedback teacher candidates receive may produce feelings of tension between teacher candidates and observers due to the dual—and sometimes contradictory—purposes of evaluation of mastery and supporting development through time. That is, evaluation of mastery has a finality that may leave teacher candidates feeling definitively labeled as proficient or not proficient in a way that squelches further dialogue, whereas supporting development over time is less about mastery and more focused on a continuous conversation about growth. Copeland (2014) suggests these incompatibilities may also be the result of divergent expectations between a teacher candidate and the teacher educator regarding the "purpose and performance of feedback" (p.468). Considering the purpose of feedback conversations, as well as the tension between mastery and growth, Hattie and Timperley (2007) identified three main foci of feedback conversations: Where am I going? How am I going? Where to next? Through interviews and focus groups with teacher candidates, they found that feedback conversations were mostly focused on "How am I going?" and not the other two foci (Hattie and Timperley, 2007). In context of this study, the teacher education department knew the teacher candidates in the credentialing program were receiving feedback, but did not know the nature or efficacy

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of that feedback. The aim of this study was to ensure all teacher candidates were receiving feedback to help them meet and sustain proficiency standards, as defined by our program-wide Danielson Observation Protocol (The Danielson Group, 2013) and to receive this Danielson-informed feedback in ways that lead to the creation of deliberate next steps to change their practice.

The 2013 Instructionally Focused Edition of the Danielson Observation Framework is composed of four domains: Planning and Preparation; The Classroom Environment; Instruction; and Professional Responsibilities. Each domain consists of a rubric with four scales: Unsatisfactory; Basic; Proficient; and Distinguished. Within each scale is a list of observable teaching behaviors that characterize each rating. The domains and accompanying scales are derived from "aspects of teachers' responsibilities" that have been documented in both empirical and theoretical research (The Danielson Group, 2013). We adapted the Danielson Observation Framework in 2013 into a Google form, which we called the *Danielson Observation Protocol*. As part of each formal observation, California State University Bakersfield Teacher Education Department (CSUB-TED) asks mentor teachers and university supervisors to complete and submit the Protocol and then use it to inform their conversation with teacher candidates.

### *The Research Goal*

With the Protocol positioned as the main medium of classroom observation and feedback within the teacher education program, the Improvement Science Research Team (ISRT) was interested in first learning how mentor teachers, university supervisors, and teacher candidates were using the Protocol. In particular, the researchers were interested in determining the extent to which the Protocol was used to help this group move from reflection on teaching into deliberate changes to practice. Within this context, the iterative adjustments made throughout this improvement science study were designed to build their capacity to use the Protocol to inform feedback and to create deliberate next steps to improve teacher candidate practice.

## Improvement Science Research Team

California State University, Bakersfield's Teacher Education Department (CSUB-TED) prepares more than 80 percent of teachers in Kern and surrounding California counties. Our ISRT was formed as an extension of the existing Kern Urban Teacher Residency (KUTR) partnership between CSUB-TED and the Bakersfield City School District (BCSD). The team is comprised of two CSUB-TED faculty members, a BCSD instructional specialist, and a former outreach candidate. Each member thus enters this work with different insights about the common program under study. KUTR was also the subject of earlier improvement science work in which one of the CSUB TED faculty members worked to track and increase the number of formal observations teacher candidates received throughout the year-long program. The result of this initial improvement science study led to structures and processes that ensured teacher candidates were being formally observed and engaged in observation feedback conversations at least once per week. The ISRT built upon this prior study to more deeply explore the nature of the observation feedback teacher candidates were receiving with the aim to ensure this feedback was both Danielson-informed and would lead to deliberate next steps to change their teaching practice.

## Local Problem Definition

At the beginning of this study, the researchers did not have a shared understanding of the existing process of formal observations feedback within CSUB-TED. To identify our starting assumptions regarding how the formal observation process currently progressed, the IRST began the improvement science work by collaboratively creating a process map to use as a baseline. The researchers also conducted empathy interviews (Hasso Plattner, n.d.) with teacher candidates, university supervisors, and mentor teachers, during which we asked these individuals to create their own process maps of formal teaching observations and post-observation feedback. An empathy interview is a valuable tool that explicates an individual's experience within the framework of a specific scenario. This approach permits researchers to evaluate students' experiences on more penetrative levels that permit for deeper understanding regarding their needs. We noted areas of convergence and divergence within and between individual maps, and then created a process map that offered a synthesis of the researcher and participant created maps (see Figure 1). Analysis revealed that researchers, university supervisors, and teacher candidates did not have a common understanding of the purposes and processes of formal teaching observations. Two gaps were particularly significant: First, each observation process map created by university supervisors, mentor teachers, and teacher candidates ended without the creation of deliberate next steps. Second, while all university supervisors claimed to provide Danielson-informed feedback, teacher candidates reported that they had never seen the Danielson Observation Protocol and were not certain how it intersected with their formal observation or with the feedback they received. This recognition represents a significant problem in terms of communication and the proposed quality improvement initiatives, and process maps offered a way to identify where expectations diverged from practice.

In particular, process maps use shapes to mark particular parts of a process: circles represent beginnings and endings, diamonds represent decision points, and squares are actions taken.

Process maps enable researchers to gain a better understanding of the mental models participants hold about a task or system and can offer further insight into what part of a task or system requires improvement. In Figure 1, the process of an observation began when the mentor teacher arrived at the school site or classroom for the observation. After the observation began, the mentor teacher reached a decision point of using or not using the Danielson Observation Protocol for their note taking during the observation. One significant finding concerns the fact that nonteacher candidates or mentor teachers had created Danielson-informed next steps based on the feedback conversation.

The researchers emerged from the problem investigation work with a theory about how to improve the gaps exposed by the process maps and empathy interviews. The lack of deliberate next steps following a formal observation and the fact that teacher candidates were not informed about the use of the Danielson Observation Protocol became focus of the improvement science study. To better ensure each teacher candidate received observation feedback designed to foster deliberate improvement to their practice in ways informed by the Danielson Observation Protocol, the researchers theorized that they could improve the feedback process by modifying the Danielson Observation Protocol. In particular, the researchers tested a final series of questions in which university supervisors/mentor teachers and their paired teacher candidates were required to work together to develop a specific, measurable, attainable, relevant, and timely (SMART) goal that was explicitly connected to a dimension of the Danielson Observation Protocol. Prior to this proposed change, the only artifact from the formal observation was the teacher candidate ratings in each domain of the Danielson Observation Framework.

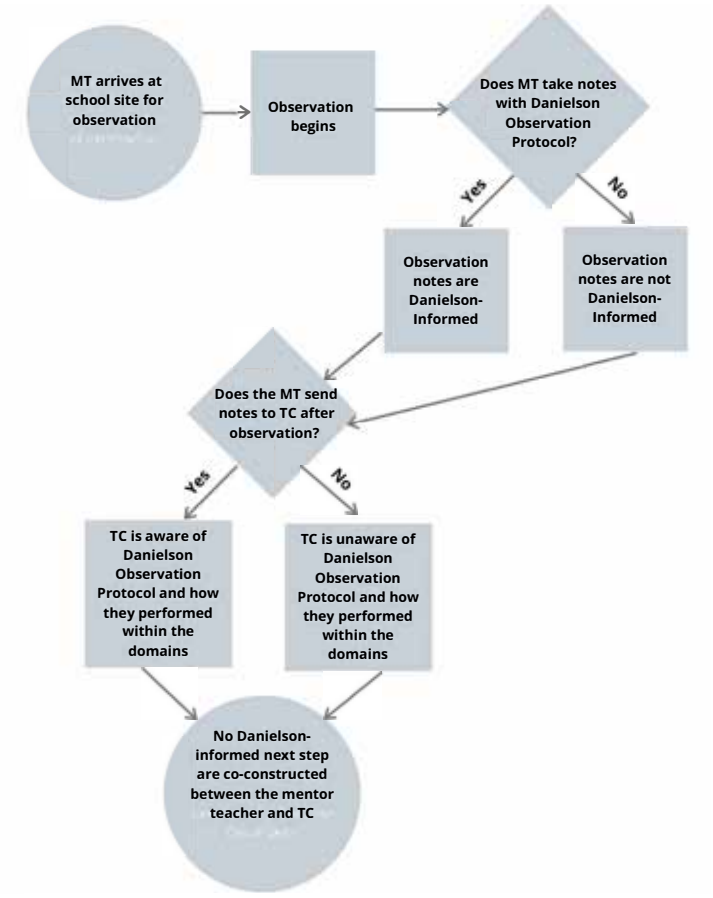


Figure 1: Process Map Baseline

The rationale for incorporating a SMART goal was twofold. Foremost, SMART goals were already being used for the school district's new teacher induction program, which all teacher candidates enter after earning their credential. Using this common language and way of tracking progress could thus better prepare them for the models of improvement they would experience during their first two years of full-time classroom teaching. Second, SMART goals helped to scaffold five possible layers of deliberate practice for mentors, university supervisors, and teacher candidates. Therefore, for the theory of change, the researchers hypothesized that if university supervisors/mentor teachers, and teacher candidates jointly worked to create SMART, Danielson-informed next steps, then teacher candidates would be more likely to know how to move toward and ultimately achieve proficiency in their teaching pedagogies through enacting deliberate changes to their practice.

## Significance of Study

The meaning-making that occurs in dialogues between novice and more experienced teachers is critical in fostering habits of mind and instructional planning processes that translate reflection on teaching into deliberate practice. By deliberate practice, the researchers draw from Ericsson (2006) and others (Bronkhorst, Meijer, Koster, & Vermunt, 2001; Daniel, Auhl, & Hastings, 2013; Dunn & Shrinner, 1999) to propose that experience enacting the work of teaching—even successful enactment—does not, alone, lead to improvement. Improving our work as educators requires opportunities to both reflect upon our teaching and develop next steps that are intentionally aligned with insights from our experiences, as well as the feedback given to us by others. The researchers also propose that feedback must be scaffolded in developmental ways that consider at what level of expertise we are currently operating and what a reasonable vision of improvement can and should look like during the next attempt at implementing a particular curricular or pedagogical practice.

Honing these dimensions of teacher development harbors significance for improving the professional development experience of the teachers with whom we work, and better teacher preparation may lead to increased teacher retention as they perceive themselves to be more prepared for their first, and often most difficult, years in the classroom (Whalen, Majocha, & Nuland, 2019; Zhang & Zeller, 2016). Carver-Thomas and Darling-Hammond (2017) identify several national trends in teacher-turnover rates. While the average rate of teacher turnover in the United States is 16 percent, the turnover rate is 70 percent higher in schools with the highest concentrations of underrepresented students and 50 percent higher in Title I schools. The reasons most frequently cited for teacher attrition are "dissatisfaction with testing and accountability measures, lack of administrative support, dissatisfaction with the teacher career, and dissatisfaction with working conditions" (p. v). To address these dissatisfactions, Carver-Thomas & Darling-Hammond (2017) recommend two practices that are most germane to this study: the creation of teacher residency programs that are tailored to meet the needs of a particular school district and that require residents to teach in the community for three to five years; and the creation of high-quality mentoring and induction programs. The context of this study took place within one of our residency programs and the central focus was how to improve the mentoring residents receive during formal observation feedback conversations. The results of this study thus provide further insight into the dynamics of both improvement science in the context of a residency program, as well as upon ways to improve the mentoring new teachers receive.

## Methods

This mixed-methods improvement science study is designed to iterate the theory of change regarding how to improve the Danielson Observation Protocol in a way that ensures teacher candidates in our teacher education program receive observation feedback that helps them to meet and sustain proficiency standards by implementing deliberate changes in their practice. Toward this goal, improvement science methodology was chosen due to its highly user-centered nature (Bryk et.al., 2016). Improvement science offered the ability to meet participant needs as they arose in the research and to quickly scale improvements with greater confidence to other similar stakeholders not immediately involved in the research project. In particular, three core questions animated this work:

1. How do university supervisors, mentor teachers, and teacher candidates understand the purposes and processes of a formal observation feedback cycle?
2. Do university supervisors and mentor teachers provide teacher candidates with specific, measurable, actionable, relevant, and timely feedback during formal observation feedback cycles?
3. Did the iterative improvement made to the Danielson Observation Protocol increase the capacity of university supervisors, mentor teachers, and teacher candidates to create deliberate, Danielson-informed changes to practice?

## Theoretical Framework

Drawing from Vygotsky (1978) and others (Dewey, 1916; Richardson, 1997), the theoretical frame of this study is social constructivism. Vygotsky argued that all learning and all cognitive function is the direct result of social interaction. That is, learning is not simply the individual assimilation of knowledge by the learner, but also the induction of the learner into a knowledge community in which knowledge is constantly co-constructed with others. In social constructivist theory, the collaborative use and interpretation of language is a central mode of inquiry for understanding how meaning-making occurs and how this both influences and is influenced by the environment in which language is being exchanged. Dewey (1916) proposes that

> The use of language to convey and acquire ideas is an extension and refinement of the principle that things gain meaning by being used in a shared experienced or joint action…When words do not enter as factors into a shared situation, whether overtly or imaginatively, they operate as pure physical stimuli, not as having meaning or intellectual value (p. 36).

Further, as Vygotsky (1957) argues, there is a zone of proximal development that must be considered as the learner interacts with a potentially more knowledgeable other. This zone of proximal development is the level of development a learner is capable of achieving with assistance from teachers or peers.

Both the co-construction of knowledge between mentor teachers and teacher candidates and the zone of proximal development of teacher candidates offer fruitful ways to think about the efficacy of feedback conversations. If a common language is not being co-constructed between the teacher candidate and mentor teacher or if the mentor teacher is not providing feedback (in content or delivery) that is within the teacher candidate's zone of proximal development, the efficacy of the feedback is reduced. Alternatively, if the mentor teacher is providing feedback to the teacher candidate that is within their zone of proximal development and is co-constructing a shared language with the teacher candidate, the teacher candidate's knowledge development and

respective practices are more likely to reflect what they are capable of achieving with guidance from a more knowledgeable other. As researchers, we view the Danielson Observation Protocol as a medium through which to develop a shared language and the collaborative development of SMART goals as a way to ensure that the content and delivery of feedback is within a teacher candidate's zone of proximal development. The collaborative nature of developing the SMART goals is also aligned with need for language and knowledge to be a co-construction in order to have "meaning and intellectual value" (Dewey, 1916, p. 36).

## Participants

The researchers interviewed and surveyed a total of three university supervisors, five mentor teachers, seven elementary teacher candidates, and two secondary teacher candidates. All university supervisor/mentor teacher participants were paired with at least one participating teacher candidate in a formal observer-observee relationship. As part of the teacher education program requirements, teacher candidates are required to be observed teaching at least six times each semester during the year-long span of the credentialing program. Notably, the research began exclusively with KUTR mentors and teacher candidates. However, in seeking opportunities to further scale the changes to the Danielson Observation Protocol, three university supervisors and three teacher candidates from the traditional CSUB-TED teacher preparation pathway were also included in the study.

For the purpose of this study, mentor teachers are defined as the full-time classroom teachers who engage in different models of co-teaching to teacher candidates throughout the academic year. University supervisors are full or part-time faculty, who are assigned to teacher candidates, in addition to the mentor teachers, and who also observe teacher candidates at least six times per semester. Within this context, CSUB-TED has both a residency pathway, as well as a traditional pathway. The residency pathway is designed as a partnership between CSUB-TED and a particular school district. Within a residency, all coursework and clinical practice are co-planed between CSUB-TED and the school district. Teacher candidates in the residency program move through the year-long experience as a cohort, are paid a living wage-stipend, and must commit to teaching in the partnering school district for at least four years following conferment of their credential. By contrast, teacher candidates in the traditional pathway teach in school districts throughout the county and gradually work toward completing coursework and field experiences as individual students. Teacher candidates in both the residency pathway and traditional pathway are assigned both a mentor teacher and university supervisor.

## Data Collection Measures

To better understand how university supervisors, mentor teachers, and teacher candidates understood the purposes and processes of formal observation feedback cycles, the researchers conducted process mapping, semi-structured empathy interviews, and focus groups, as well as mixed-methods online surveys regarding participants' experience with three observation-feedback cycles throughout the course of an academic year. All modes of data collection were designed to gain insight into the participant experience with and feelings about the processes, purposes, and outcomes of formal observation feedback conversations. Empathy interviews (Hasso Plattner, n.d.), in particular, offered deep introspection into what individual participants thought about his or her mentor or university supervisor, estimated the efficacy of the feedback received, and considered viable suggestions for changes to the Protocol. After each observation feedback cycle, university supervisors, mentor teachers, and teacher candidates' responses to the Danielson Observation Protocol form were analyzed to inform subsequent changes to the Protocol.

University supervisors, mentor teachers, and teacher candidates were also asked to complete an online Google survey regarding their experience with each of the three iterations of the Danielson Observation Protocol. The Google survey was composed of questions regarding the ease of use of the Protocol and the efficacy of it for helping university supervisors, mentor teachers, and teacher candidates develop collaborative, Danielson-informed, and SMART next steps. Participants were also asked to both complete a Likert scale for ease and efficacy of the form, and were then given an open-ended space to explain their rating of the form, as well as to provide any other insight into their experience during the observation process.

## Data Analysis

The data from each observation-feedback cycle were initially analyzed by a Plan-Do-Study-Act (PDSA) protocol (Langley, et al., 2009). PDSA protocols are characterized by the rapid development of questions; identification of data to best address those questions; data collection plans; and analysis of data to inform the design of questions, data collection, and interventions for subsequent PDSA cycles. As a pillar of improvement science, PDSA cycles help to facilitate smaller tests, more rapid learning, and ultimately, the ability to scale improvements with greater confidence as a way to meet the needs of individuals in real-time. A total of three PDSA cycles were implemented throughout the course of an academic year, with each cycle lasting approximately three months.

To dig deeply into the data collected with each PDSA cycle, the research team engaged in code development and thematic

analysis of the data in order to identify patterns that addressed the previously identified questions and to generate new and/or to refine existing questions (Boyatzis, 1998; Braun, Clarke, Hayfield & Terry, 2019). In particular, we posed questions and collected and analyzed data regarding the Danielson Observation Protocol to fine tune how teacher candidates, mentor teachers, and university supervisors understood the feedback process. Further examined was the feedback's connection to the Danielson Observation Protocol and the extent to which teacher candidates were able to collaboratively identify specific, measurable, attainable, relevant, and timely (SMART) next steps with their university supervisor and/or mentor teacher.

## Findings

The researchers conducted three PDSA cycles to test the change idea for improving the Danielson Observation Protocol. This section outlines the results from each cycle, noting the questions, the types of data collected, findings from the data, and the manner in which learning outcomes shaped each subsequent PDSA cycle. This level of detail is essential to understand how and why the measures and interventions evolved over time. Indeed, in keeping with the conceptual framework of improvement science, not all of the changes made led to improvement and, therefore, it is necessary to note how the continuously modified theory of change shaped and was shaped by each PDSA cycle. Given the multivocal and multimodal nature of how each cycle of data collection informed subsequent cycles, Table 1 offers a summary of the questions, participants, and data collected during each PDSA cycle.

### *PDSA Cycle 1: October-November 2018*

Based on the baseline map created to define the core problem of the study (see Figure 1), the researchers decided to add an explicit step to the Danielson Observation Protocol. This step required teacher candidates and mentor teachers to collaboratively identify a SMART goal at the end of the feedback conversation. Specifically,

**Table 1: Overview of Plan-Do-Study Act (PDSA) Cycle**

| PDSA | Driving Question | Participants | Data | Key Outcomes |
|---|---|---|---|---|
| **Cycle One** | Will requiring mentor teachers and teacher candidates to collaboratively develop SMART goals lead to more deliberate next steps to improve practice? | Mentor teachers, university supervisors, and teacher candidates | SMART goals; Google survey | • The goals created by participants were not SMART. In particular, participants struggled with creating goals that were measurable and timely. |
| **Cycle Two** | Will scaffolding the creation of SMART goals for mentor teachers, university supervisors, and teacher candidates lead to more deliberate next steps to improve practice? | Mentor teachers, university supervisors, and teacher candidates | SMART goals; Google survey; focus groups | • The university supervisors had different mental models of effective feedback, which led to different engagement with SMART goals by university supervisors.<br>• A lack of training and practice with SMART goal was correlated to these gaps.<br>• Teacher candidates felt SMART goals led to clearer, more deliberate next steps to improve their practice. |
| **Cycle Three** | Will implementing training on how to create SMART goals increase the efficacy of mentor teachers, university supervisors, and teacher candidates collaborative creation of SMART goals? | Mentor teachers, university supervisors, and teacher candidates | SMART goals; Google survey; focus groups; process maps | • University supervisors still had different perspectives regarding the efficacy of SMART goals.<br>• Teacher candidates valued SMART goals. For the university supervisor who did not create SMART goals, the teacher candidate felt overwhelmed with too much feedback.<br>• All university supervisor and teacher candidate pairs created next steps, even though they were not all SMART next steps. |

the researchers added the following free response question to the Protocol: "Collaboratively identify one goal that is specific, measurable, attainable, relevant, and timely (SMART)." To assess the efficacy of this additional Protocol requirement, we evaluated the specificity, measurability, attainability, relevance, and timeliness of each goal, as well as the goal's alignment with the domains of the Danielson Protocol. This data analysis revealed the goals created by the mentor teacher and university supervisors, in collaboration with their respective teacher candidate, were largely attainable and relevant, but not specific, measurable, or timely. For example, one teacher candidate and mentor teacher team chose the goal, "Make sure I use the same techniques in teaching to help children in their formative assessment in writing." No goal was fully SMART or explicitly Danielson-informed, which reduced the likelihood of teacher candidates knowing how to make a deliberate change to practice in ways that helped them meet and/or sustain proficiency standards.

Further, to address the feedback from our initial empathy interviews that teacher candidates had neither seen the Danielson Observation Protocol nor understood how it intersected with the formal teacher observation process, we required the teacher candidates, mentor teachers, and university supervisors to create the SMART goal "collaboratively." While mentor teachers and university supervisors were trained in the use of the Danielson Observation Protocol, the researchers learned during empathy interviews that they relied on their own informal note taking during the observation and following feedback conversation. Mentor teachers and university supervisors understood the Protocol as a measure of mastery CSUB-TED wanted, yet viewed their personal notes as better suited to inform growth-oriented conversations with their teacher candidates.

To evaluate the extent to which mentor teachers, university supervisors, teacher candidates perceived the goals to be collaboratively developed, the researchers created and sent a Google survey to each participant. The data from these surveys revealed that both members of each mentor teacher/university supervisor and teacher candidate team perceived the goals to be collaboratively developed. One their own ne of the teacher candidate/mentor teacher pairs decided to complete the entire Danielson Observation Protocol collaboratively. That is, they went through each domain and, based on the mentor teacher's observation notes and the teacher candidate's first-hand experience teaching the lesson, they collaboratively scored each section. Both the mentor teacher and teacher candidate indicated that this joint scoring helped to "more deeply stay rooted" in the Danielson framework while simultaneously reducing "feelings of anxiety" and the "top down" nature of the conversation.

### *PDSA Cycle 2: January-February 2019*

Based on the results from PDSA cycle 1, the researchers decided to provide scaffolding on the Danielson Observation Protocol for the development of SMART goals. Specifically, sentence frames were added to bring explicit attention to each component of a SMART goal. To accompany the sentence frame, we also offered an example of a completed sentence frame.

> *Example:* Based on my Danielson proficiency level in Engaging Students in Learning, I will not call on the same students repeatedly because this provides more opportunities for all students to share their learning. I plan to meet this goal by October 4, 2019. I know this goal is met when I create an opportunity for each student to share or show their thinking with the class at least once during a school day, and I will track this by noting student participation on a roster throughout the day.
>
> Based on the feedback I received on the Danielson Framework Domain _____, I will improve instruction and/or assessment by _____. I plan to meet this goal by the following date _____. I know I have met this goal when students demonstrate _____ and I will track this by _____.

With this example and sentence frame, participants engaged in another round of the formal teaching observation process. Data analysis revealed that all mentor teachers and university supervisors except one, were able to use the example and sentence frame to inform the creation of SMART goals with their teacher candidates. The university supervisor who did not create a SMART goal instead created a list of what the teacher candidate should do differently. The Google survey results offered insight into how and why each SMART goal portion of the Danielson Observation Protocol was completed in these divergent ways.

The university supervisors and mentor teachers who were able to collaboratively create a SMART goal with their teacher candidates indicated that they found this new element of the form to be valuable and that it was "just what the form needed." However, the university supervisor who intentionally chose not to complete a SMART goal found this element of the form to be "too broad" and indicated that the addition of the SMART goal "wasn't necessary" because she already "writes and discusses" what needs to change with her candidates. In addition, this university supervisor considered the sentence frame "too formulaic" and that it "restricted authentic dialogue" with their teacher candidate.

Yet, the Google surveys completed by the participating teacher candidates challenged this mental model of the observation. The teacher candidates who created a SMART goal with their

university supervisor, concluded that the form now had "clearer improvement expectations," "the ability to check for improvement" from one observation to the next, and that the "feedback was condensed, but just as informative." The teacher candidates who did not create a SMART goal with their university supervisor, indicated that they were receiving "too much feedback" and were therefore "not sure what to do next." These conflicting views between university supervisors /mentor teachers and among university supervisors /mentor teachers and teacher candidates highlighted how mental models of observation feedback conversations were informing, more broadly, both effective and less effective uses of the Danielson Observation Protocol, as well as specifically attributing to the creation of deliberate, Danielson-informed SMART goals. Insight was also gained into what type of feedback may be most understood and ultimately engaged in by teacher candidates in their efforts to move toward proficiency. Feedback that was brief and clearly actionable was more likely to help teacher candidates understand how to transform reflection on teaching into action. To more intentionally help mentor teachers and university supervisors understand this feedback, we implemented a brief, one-hour training to share teacher candidates' feedback and to demonstrate how to work with teacher candidates to develop deliberate, Danielson-informed SMART goals.

### *PDSA Cycle 3: March-April 2019*

In order to gain insight into how the training impacted mentor teacher and university supervisors' capacity to create Danielson-informed SMART goals with their teacher candidates, the researchers kept the revised Danielson Observation Protocol the same as in cycle two. Analysis of the SMART goal created during PDSA cycle three revealed a continued lack of consistent implementation. Most notably, the university supervisor who did not create a SMART goal in PDSA cycle two also did not create a SMART goal in cycle three. To explore this lack of consistency, we decided to conduct both Google surveys, as well as focus groups, with teacher candidates, mentor teachers, and university supervisors, respectively. All participants indicated the form was "effective" or "very effective" in terms of the way it scaffolded the creation of feedback that leads to deliberate action. One university supervisor offered the following insight: "That worked quite nicely, and we came up with some more specific things because of the guidance here." Another university supervisor noted, "I enjoyed the feedback process because it allows me to really understand where the candidate feels they are struggling and how we can amend that issue or at least start moving in the right direction." The teacher candidates, too, expressed how the form "made them feel like they knew exactly what to do next" and, the collaborative nature of the feedback "reduced anxieties" about the feedback conversation.

Teacher candidates whose university supervisor did not create SMART goals expressed persistent feelings of being "overwhelmed" by the feedback. Nonetheless, the teacher candidates' new ability to explicitly reference the Danielson Observation Protocol during observation feedback conversations "increased their understanding of what proficiency looks like." Therefore, although the SMART goals were not implemented with fidelity by the participants, all university supervisors, mentor teachers, and teacher candidates thought their post-observation feedback offered a clearer set of next steps for moving toward proficiency, as defined by the Danielson Observation Protocol. As a result, teacher candidates, mentor teachers, and university supervisors began to share expectations for the purposes and performances of feedback conversations.

We also used the final focus group to assess how teacher candidates, mentor teachers, and university supervisors conceptualized the changes the researchers had made to the formal observation feedback process over the course of the study. The researchers as well created process maps based on their mental maps of the iterative changes. These process maps were then analyzed, and patterns of consistency and inconsistency were coded. These codes were then used to inform the creation of a synthesized map that captured commonalities and moments of divergence (see Figure 2).

Figure 2 demonstrates that formal observation feedback became more of a collaborative effort between the teacher candidates and the mentor teachers. The observation feedback also now culminated with the creation of Danielson-informed SMART goals, as well as in the articulation of those goals in a precise manner that both opened up to an achievable action and did not overwhelm the candidate.

## Discussion

Through this study, the researchers made progress toward understanding and increasing the efficacy of observation feedback conversations. In particular, the researchers engaged in three PDSA cycles, which were each characterized by revisions to the Danielson Observation Protocol. Early cycles of testing and analysis revealed inconsistent observation processes and a consistent lack of actionable, Danielson-informed feedback at the end of an observation feedback conversation. Each of these gaps and inconsistencies limited the potential of observation feedback conversations to lead to more deliberate practice by teacher candidates. Empathy interviews, surveys, and focus groups further revealed that there were discrepancies between the quality and appropriate quantity of feedback the university supervisors /mentor teachers perceived they were giving and the ways

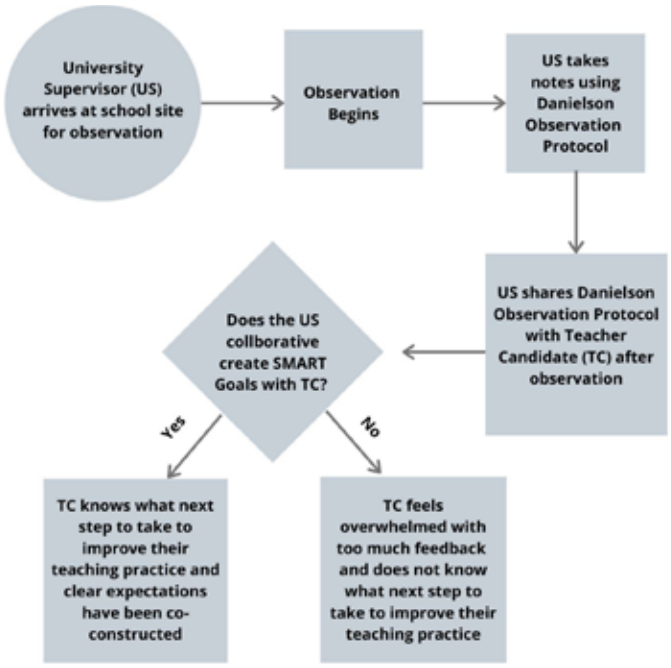


**Figure 2: Process Map Results**

in which teacher candidates were able to act on the feedback. Specifically, while mentor teachers/university supervisors felt they were giving ample, high quality feedback, several teacher candidates felt they were given too much feedback and were thus not able to identify clear, deliberate next steps. From this discrepancy, researchers learned the quantity of feedback and the way in which the feedback is delivered has consequences regarding the extent to which teacher candidates internalize and take subsequent action following observation feedback conversations.

Each revision to the Protocol was thus designed to further ensure teacher candidates were receiving deliberate, Danielson-informed feedback from mentor teachers and university supervisors in ways that helped them to achieve proficiency. We also gained insight into the social dynamics of improvement science. That is, we observed how some programmatic cultures and individual attitudes are more receptive to the unique demands of improvement science. Flexibility, adaptability, and the willingness to pilot an intervention quickly with fidelity and without complete information or assurance of success are essential groundings for this type of research. Nonetheless, our data largely supported our theory of change, which postulated that if university supervisors /mentor teachers and teacher candidates worked together to create SMART, Danielson-informed next steps, then teacher candidates would be more likely to know how to move toward and ultimately achieve proficiency. As a result, the Teacher Education Department is moving to further scale this work across the program in the coming year, leveraging the learning from this past year to shape the feedback conversations among more mentor teachers, university supervisors, and teacher candidates.

## Implications and Recommendations for Future Research

Ultimately, the findings of this study offer further insight into how feedback conversations can be improved to ensure teacher candidates are receiving feedback that is within their zone of proximal development and that the co-construction of feedback enables them to enter into a knowledge community with their mentor teachers. Critical to this improved feedback process is the development of a shared language with their mentor or university supervisors regarding what it takes to improve their teaching practice. The Danielson Observation Protocol, once used as it was intended, served as a medium for developing a shared language and set of expectations regarding the purposes, processes, and outcomes of observation feedback conversations.

However, further research is needed to elaborate on the proposed theory of change. In particular, exploration of the mental models of university supervisors, mentor teachers, and teacher candidates, as well as other stakeholders who are a part of this work, namely, district administrators, teacher education department leadership, and K-12 students, are critical to addressing gaps between mentoring theory and practice. The layer of the K-12 student experience is particularly interesting as these teachers are also being observed but rarely asked about their experience with the observation. Research into training for university supervisors and mentors regarding the significance of SMART goals and how to create them is also essential to ensure more consistent implementation of this change idea. Further, and perhaps most significant, is an examination of the extent to which the creation of deliberate, Danielson-informed next steps result in actual changes to practice during the teacher candidate's next attempt at enactment.

Ultimately, the learnings and next steps from our work exemplify the improvement science approach of iterative cycles of testing, starting small to learn fast, and scaling with greater confidence in the practices being implemented.

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Journal for Quality Perspectives in Knowledge Acquisition

An analytical retrospective on constructing improvement science frameworks within higher education systems

# A Reflective Summary: Common Themes, General Insights, and Challenges for the Future

*Paige Ware, Cody Huie, Jasmin Morales, and Paul LeMahieu*

As the accounts from each of the educator preparation teams in this volume illustrate, building toward change within an improvement science framework entails a number of key shifts. At the macroscopic level, improvement science pivots attention away from traditional accountability or research and development perspectives. Instead, it embraces a framing that seeks first to understand the problem in the context of its harboring system in order to construct a theory of improvement in a context that can drive effective and sustainable change.

This overarching shift, in turn, re-situates how evidence is regarded in an improvement science context, such that data emerges directly from the change efforts through systematic and frequent use of practical measures that are unobtrusive, timely, and relevant to practice and its impacts. As significant, such evidence for improvement is regarded and used to support networked improvement rather than the more managerial functions of accountability and compliance.

At a personal level, beliefs are transformed. A fundamental belief of improvement science is that significant change at scale can and will take place by amassing small and iterative change. This replaces conventional trust in large-scale efforts and top-down decision making in order to shape practice as the surest means to effect positive change. These changes in belief systems are often accompanied, as documented in these articles, by a shift in the mindsets among individuals. By working collaboratively, these individuals are learning together to slow down and systematically understand local problems in their systemic contexts before making, then testing and refining, changes that are informed by a shared theoretical vision of improvement and by a clear and systematic approach to inquiry. In this epilogue, we will return to the preceding articles as cases in order to synthesize across the several themes established in the introduction to this volume: tracing the movement from individual to collective action; unpacking the promise and challenge of data-informed transformation of practice; examining the shift in mindsets necessary to engage in networked improvement science; interrogating the possibility of making significant change at scale from iterative testing of change in practice; and exploring the challenges that these teams encountered, especially in their higher education settings. In looking across these articles, we will address three domains: a synopsis of the practical lessons learned from the chapters in this edited volume; a summary of the conditions for success presented by these localized efforts and the challenges presented in learning to do improvement work; and a synthesis of forward-looking ideas that can frame and inspire an improvement science approach in research-practice partnerships.

## Shaping Problems of Practice in Educator Preparation

Journeys into improvement science begin with a common compass that orients teams to the importance of collaboratively and systematically identifying a problem of practice (Bryk, Gomez, Grunow, & LeMahieu, 2015). The impetus for the collective improvement work in this volume emerges from persistent challenges in educator preparation: variation in the quality of teacher candidates, minimal and often highly variable opportunities for clinical practice, uneven partnerships with local school districts, and an external climate often characterized by compliance and accountability. Each of the teams in this volume took up

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the work of identifying a local problem of practice that could help them close the performance gaps created by these larger forms of unwanted variability in practice. At CSU Bakersfield, for example, the problems of practice focused on the need to provide more purposeful, coordinated feedback to teacher candidates, so their improvement work iterated on their feedback protocols and feedback communication strategies. At CSU Cal Polytechnic, a system of support for new teachers as they transitioned into their first years as teachers of record within classrooms was developed. Within the CSU Educator Quality Center, efforts turned to creating a more dynamic and user-oriented culture around data collection and use.

Throughout each of these improvement efforts, each team drew upon multiple sources of evidence, significantly including user perspectives before identifying action ideas and then determining initial steps. They documented the shifts in mindsets that took place within their teams as they learned to take on an inquiry-oriented stance and social learning approach to this work. They acknowledged that, by starting slowly to dig into the root causes of their problem of practice, they could more purposefully tap into the multiple human experiences that can profitably inform improvements to the system. Ultimately, each of their forays into the work of improvement science helped initiate a new kind of dialogue among networked partners about how to imagine and engage with system-level improvement structures.

## Digging into Data and Developing Data Routines

The use of data to inform and transform practice is a fundamental principle of improvement science (Bryk et al., 2015). Data serve as an anchor for developing working theories of improvement, as feedback to refine theories over time, and as evidence to support whether improvements result from changes made (Dolle, White, Takahashi & Donahue, 2020). Unfortunately, in education, an overreliance on accountability to motivate improvement has produced data systems for compliance, and rarely, if at all, do teacher preparation programs have access to or use appropriate data for program improvement. Improvement efforts necessitate the collection of this type of data regularly; thus, improvement networks must develop new structures to collect, analyze, share, and use data. Teams new to improvement science are quick to learn that what counts as evidence is grounded in a very different conceptual model than what is typically found in traditional education research and accountability systems in higher education. Data in improvement science, particularly in contexts such as education in which human interactions are central, stems from— and revolves around—local users. Teams gather information from the people who experience all possible aspects of the system, from frontline workers who help shape the system and implement its routines to end users of products and services, whose work is directly impacted by the system (LeMahieu, Grunow, Nordstrom, & Baker, 2017). Critical to canvassing multiple users of a system is developing a strong system for routine dynamic data collection and interpretation such that data can be collected, and reflected upon, in systematic ways at frequent intervals. This iterative approach creates a dynamic information cycle of relevant and timely data that make it possible to interpret and act upon relevant data as change ideas are introduced.

From the reports of many members within this networked community of educator preparation providers, such an orientation to evidence and its use was quite novel. Several common patterns in how they took up this approach to gathering and using data surfaced. For example, many teams made use of improvement tools, such as driver diagrams and fishbone diagrams, to identify root causes in order to tap into potential primary and secondary drivers addressing their problems of practice. They each set up Plan-Do-Study-Act (PDSA) cycles to test their change ideas across the year and emphasized the importance of developing routines to guide these PDSA cycles, so that they focused on starting small, gathering feedback, and analyzing progress toward change to inform the next iterative cycle. The on-the-ground tools used most frequently to gather ongoing evidence were those that drew on the lived experiences of multiple stakeholders across the system. Empathy interviews and journey maps emerged as salient practices and were directed toward a variety of system users: teacher candidates, supervisors, coaches, university faculty, district partners, and facilitation team members. Some teams categorized their data as process measures (e.g., attendance records, participant surveys and interviews) or as outcome measures, including formal protocol-driven observations, interviews, and surveys. Other teams distinguished less clearly between these two dimensions and instead integrated different types of data from a range of informants as an ongoing part of the PDSA cycles.

Ultimately, even as the specific tools and protocols selected by teams differed according to their locally determined problems of practice, several common attributes can be seen across the tools they used. These core concepts are captured by the descriptors that consistently surface across their articles: relevance, frequency, rigor, efficiency, productivity, distribution, and systematic perspectives.

The framework of improvement science, while providing the methods to support inquiry, also helped shape team members' conceptual approach to improvement as grounded in these

underlying attributes. The interplay among the testing cycles that informed data collection, the tools that supported the gathering of information, and the routines that guided data-informed action converged to support systematic and rigorous problem solving.

## Roles and Responsibilities of the Individuals and Teams

The experiences captured by members of the improvement teams in this volume provide a clear portrait of how productive teams initially formed and then sustained their collaboration.

First, the initial composition of team membership was guided by a core principle of improvement science to value multiple perspectives across the spectrum of system users. At the outset, therefore, teams were required to form with at least five representatives drawn from across university and district partners. University partners included teacher education faculty at various stages of their careers, as well as key institutional leaders, whereas representation from district partners varied from the inclusion of teachers, instructional specialists, supervisors, mentor teachers, and district liaisons. Next, team roles were allocated in ways that created a fellowship team lead who helped orchestrate the collaborative work.

One of the articles in this volume is particularly relevant to these points, as they directly explored the roles and responsibilities of the team members. The CSU Educator Quality Center team conducted a self-exploration of the ways their own support services for CSU educator preparation programs could help them "shift beyond a data delivery organization to a delivery and improvement organization" (Simon, Kolbe, & Tuss, 2020). With the need for ongoing, useable, and grounded data at the heart of improvement work, they explored how to support teams in maximizing their efforts. Through this inquiry, they identified critical gaps in communication among assessment coordinators and data specialists, on the one hand, and education faculty and district supervisors on the other. They created a data coach position to help close these gaps, indicating that systemic supports may well require imagination to develop new roles that support improvement work in higher education.

## Understanding the Conditions that Support Improvement Work

Improvement networks are scientific professional learning communities comprised of a diverse set of members who, historically, have not typically collaborated closely, but who are nonetheless characterized by a shared commitment to a common aim and a "learning by doing" orientation (Bryk et al., 2015; Sherer et al., 2019). Network leaders are therefore tasked with creating the conditions under which often newly formed teams can thrive in improvement work. They must foster a cohesive, collaborative environment and manage the social dynamics of their membership toward the attainment of the common aim. To these ends, we review some of the lessons learned from these articles that illuminate the structural and cultural conditions that members and leaders must attend to as they cultivate a productive and sustaining network.

## Structural Conditions of Time and Technical Support

The importance of providing structured time to engage in improvement was a resonant theme throughout this volume and is a fundamental condition of a productive network. Different stages of improvement science make different demands on members' time. Throughout the initial phase of the improvement journey, time is dedicated to learning and understanding the principles of improvement science, to building the network capacity to engage with its tools and processes, and to forging a sense of community within the network. Once the network establishes a working theory of improvement, time is then allocated to testing changes within the individual organizations, collecting data, and engaging in social learning across the network.

Until improvement science becomes institutionalized, these asks of members' time are often made in addition to, or even in place of, typical duties and responsibilities. Therefore, it may benefit network leaders to be prepared to address existing demands on network members' time and the context within which members operate. In higher education, for example, the existing incentive structure prioritizes that time and talent be directed at scholarship, teaching, and service. The Improvement Research Fellowship discussed in this volume offers an approach to structure the improvement work in a manner that aligns with the demands of higher education (Beck, Santiago-Evans, Gonzalez & Davis, 2020; Flushman, Hess, Guise, & Flessner, 2020).

In these participating institutions, we see a number of structures that support collaborative work and social learning. In-person convenings, shared trainings, as well as common tools and resources all support community formation and cohesion in using improvement science in pursuit of a common aim. So too, does each of several forms of virtual support, including webinars and online collaborative platforms. It is worth noting that virtual tools can generate enthusiasm for work early on. However, while they inherently provide support contexts for introducing and practicing improvement science, they do not facilitate all the social connections fundamental to maintaining a productive

network. For this reason, a well-facilitated improvement network thoughtfully integrates virtual and face-to-face strategies. Because improvement science is a relatively new and novel approach in education, most participants in improvement networks lack the technical skills necessary to apply improvement science methodologies. Therefore, individuals and institutions engaging in this work for the first time need a support system to help them obtain the knowledge and skills to engage with the tools, use data in a new way, and create structures that foster social learning. In the case of the New Generation of Educators Initiative, WestEd served in this support role by providing teams from individual teacher preparation programs with a multipronged technical assistance strategy that included building organizational learning capacity, coaching, and networked learning experiences. Throughout the year-long fellowship, this included five, two-day in-person learning sessions and ongoing coaching and staff reviews for support and feedback.

## Cultural Conditions that Cultivate Team Trust and Mindset Shifts

The articles herein underscore the importance of a team-based approach and go as far as to suggest specific roles that are essential in enacting the approach: a dedicated continuous improvement lead, a data manager, and executive sponsorship with the authority, or at a minimum, the influence to affect change. Though thoughtfully selecting a diverse team and attending to specific roles is necessary to begin this work, it is not sufficient. Improvement science requires specific beliefs and dispositions. Foremost is the motivation to improve. A commonly held belief within improvement science is that systems are predetermined to get the results they produce. This belief implies the existence of cultural and structural inertia. Therefore, the motivation to improve must outweigh this inertia. Other dispositions essential to the improvement mindset include humility, openness, adaptability, situational awareness, and competence in the subject area (Biag and Sherer, 2019). If network members do not possess these dispositions, they must create an environment that fosters their development. That said, an openness to improvement and an orientation toward learning is a precondition for engaging in improvement science.

All improvement occurs within human systems; consequently, it is essential to attend to the human side of change. Engaging in improvement work is a vulnerable endeavor. Networks commonly include individuals from across organizational boundaries who typically do not work together—but whose work is interdependent—with the explicit goal of surfacing and discussing problems. The NGEI initiative, for example, included representation from the teacher preparation programs and districts that they serve. From the perspective of a teacher preparation program, considerable discomfort might arise from talking openly about institutional problems in the presence of school district representatives. Consequently, network leaders must foster a sense of relational trust across the network through conscious and concerted efforts to create social connections with people; establish shared beliefs, norms, and values; and convey clear expectations for participation.

As noted throughout the volume, the pervasive culture in teacher preparation is one of an overreliance on accountability to motivate improvement. This manifests itself in the norms, roles, and data infrastructure established for compliance. To engage in continuous improvement requires a shift in related beliefs and values, which, in turn, requires strong leadership with the capacity to transform organizational culture from a focus on compliance to one of continuous improvement. Organizational leadership is singularly responsible, not just for direction setting and operational maintenance, but also for establishing and maintaining a culture conducive to its identity and aspirations. In the case of an improvement organization, this means establishing a culture that supports interpersonal relations and intrapersonal dispositions necessary to enact quality improvement. Such leadership operates on two levels: within the network and at the individual member institutions. Because of the loose authority structure and dispersed nature of many networks, they typically have some form of leadership structure responsible for convening, communicating, and supporting the learning of others (Sherer et al., 2019). At the institutional level, leaders must cultivate a culture that embraces failure as a learning opportunity, adopts approaches that promote testing of ideas and frequent use of data, and reinforces the importance of slowing down to gain perspective on the problem. From a technical perspective, leaders must also prioritize the improvement efforts and address the structural barriers to change. Furthermore, leadership is responsible for leveraging or protecting the network from the larger environmental context within which the network operates.

## The Prospect of Enduring Change

It has been observed that, if one seeks changes that are highly visible and widely noted, one should implement large noteworthy programs. But if one seeks change that is deep, widespread, and enduring, one should change the way people think about some issue or problem. Better still, and relevant to the advent of networked improvement science, we should seek to change how people think about problems themselves.

The efforts described in this volume, both individually and collectively, respond to this advice. As noted above, significant change is amply documented in this volume. This

change is relevant, not only to the specific problems of practice herein addressed, but also to the knowledge, skills, practices, dispositions, and norms of those who formed the Networked Improvement Community (NIC) to address these problems. Collectively, such change comprises a form of "professional field building" that might optimistically engender change well beyond the confines of these specific problems or the NIC convened to address them. Specifically, the elements of professional field building that are readily visible in these efforts include: seeing and working on problems in a new and different way; developing individual and institutional capacities to support improvement; preparing successive generations of professional educators to engage in improvement; and making contributions to the development of an improvement infrastructure to support the spread and use of networked improvement science. We close this volume with brief comments on the meaning, importance, and prospects for transformational field building in each of four areas.

## Seeing problems in new and different ways

At its most fundamental, networked improvement science offers a new and fundamentally different way of seeking improvement in education. Rather than seeking to impose solutions *ex machina* or asserting that best practices can succeed even when heedless of local conditions and contexts, improvement science suggests a way to develop a deep and shared understanding of the problem. The problem is refracted through an analysis of the context that gives rise to it, and within which potential solutions must succeed to be improvements, along with an explicit theory of improvement. This integrated whole vision of the problem is necessary to realize changes that are effective and reliable when implemented at scale. It then supports these shared foundational understandings with a rigorous methodology to test ideas and support the social learning that is essential to widespread improvement.

The articles in this volume demonstrate the means of implementing this approach to solving educational problems and fostering improvement at scale. They suggest the beginnings of transformational change for those engaged in the effort. Beyond addressing the specific problems of practice taken up by these individuals, several of them suggest that the improvement science approach can be employed in ways that they believe will also serve usefully in addressing other problems and efforts to improve more generally. Certainly, the CSU Educator Quality Center (Simon, Kolbe, & Tuss, 2020) both suggest broader interest in the methodology and the intention of using it in other work as well. This kind of transfer is encouraging regarding the prospects of the improvement science approach becoming the "new normal" in efforts to improve performance and redress inequities in the system.

## Developing individual and institutional capacities to support improvement

In addition to the direct use of improvement science methods by those engaged in this initiative, these individuals and their institutions represent a growing capacity to provide technical assistance and support to others interested in using these methods. A vision of a mature system widely embracing these tools would necessarily include the capacity for technical assistance and support to frontline educators engaged in their use. The development of networks and professional communities, such as this one, with the necessary knowledge and skills, is an important sign of the maturation of the field in this regard. It is to be encouraged and, in the ideal, explicitly supported to ensure widespread uptake and use of this approach to improvement.

## Preparing successive generations of professional educators to engage in improvement

It should be noted that several of these organizations (specifically CSU-Bakersfield and CSU-Cal Polytechnic San Luis Obispo) play significant roles in the preparation of professionals for service at all levels of the education system: teachers, principals, central office administrators, and executive leaders. As such, they are uniquely situated to advance the use of improvement science by embedding it in the professional preparation of educators (Velásquez, Biag, Gomez, and Imig, 2019).

In this regard, the healthcare field offers an instructive example. Throughout the past 25 years, the healthcare profession has embraced improvement science and realized significant improvements to practice through its use. For very nearly every healthcare professional (nurses, technicians, doctors), the use of improvement science is an extension of their professional preparation. They are trained, first and foremost, in the scientific method, learning its conceptual underpinnings. They are socialized into its practices. They expect that throughout the course of their careers they will constantly enhance their knowledge by drawing upon scientific inquiry. Most will, at some points throughout their careers, participate in such inquiry themselves—be it in the form of clinical trials or testing innovations in medical procedures or administrative routines. Education does not have anything similar in its professional preparation. The thoughtful embedding of improvement science into educator preparation programs, with different knowledge (depth, breadth, and kind) appropriate to different roles within the system, would do much

to make the field more hospitably inclined toward and able to ensure the widespread use of these methods.

## Early contributions to the development of an improvement infrastructure

For years, the field of education has been carefully developing what might reasonably be considered an accountability infrastructure. The forms of assessment in use, the data that are routinely gathered, the forms of analytics, as well as the uses to which such data are put all comprise an elaborate infrastructure intended to support compliance with policies and accountability for performance and outcomes (Peurach, 2016; Peurach, Penuel, & Russell, 2018). What is needed is an analogous form of infrastructure that is supportive of evidence-based improvement methodologies like improvement science.

Such infrastructures abound throughout modern enterprise. The federal highway system, the power grid, the National Oceanic and Atmospheric Administration, and the Centers for Disease Control are all examples of contemporary support infrastructure. Although some are physical infrastructures, others are knowledge and expertise infrastructures. But what they have in common is providing capacities greatly needed by all, yet beyond the wherewithal of any individual or collective to provide. Mature improvement infrastructures in education would necessarily have certain characteristics:

- widespread and self-renewing so as to be enduring through time;
- imbued with the resident forms of expertise (content knowledge, improvement knowledge, knowledge of human change in systems) necessary to engender, spread, and sustain improvements;
- support activity sets that are routinely and repeatedly engaged over time;
- capacity to support multiple efforts of improvement in executing key activity sets in education (measurement and analytics, problem and system study, as well as iterative prototyping and testing of changes as potential improvements);
- support systems (e.g., data capture, management, and analytics, collaborative technologies, etc.) necessary to initiate and maintain improvement efforts; and
- human capacity (leadership and operational) to conceptualize and execute improvement work.

The time is right for an improvement infrastructure in education, and these initiatives transcend their identity as individual improvement efforts to illustrate a nascent form of such an infrastructure. Certainly, the CSU Educator Quality Center offers a striking example of this in its efforts to develop the institutional capacities necessary to effectively support improvement science in the teacher preparation programs that it serves (Simon, Kolbe, and Tuss, 2020). Were it to adopt improvement methodologies for broad use in its work, it would become an important element of such an infrastructure.

The crosscutting themes, common issues, and challenges implicit in the work described in this volume, taken together, offer a sense of the insights, potentials, and challenges of employing improvement science methods at scale. To render explicit the important learnings of this initiative makes them available for widespread dissemination and use. To articulate the field- building challenges suggested by this work points the way to realizing its transformative potential to enable change that is truly deep, widespread, and enduring.

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## In Appreciation

The following individuals served as Invited Guest Associate Editors for this inaugural issue of the Journal for Quality Perspectives in Knowledge Acquisition

John Dew

**Dr. John Dew** *served as a quality professional for 24 years with Lockheed Martin Corporation prior to serving as the director for continuous quality improvement and planning at The University of Alabama (UA). Dew moved from UA to Troy University, where he served as senior vice chancellor for student services and sdministration. He is a Fellow of the American Society for Quality and an Academician in the International Academy for Quality. Dew earned his Ph.D. in education at The University of Tennessee and is the author of five books in the quality field. His email address is jdew@ua.edu.*

Julie Furst-Bowe

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**Dr. Kenneth Reid** *holds a Ph.D. in engineering education and is an associate professor at Virginia Tech. He and his co-authors were awarded the Wickenden award (Journal of Engineering Education, 2014) and Best Paper award, Educational Research and Methods Division (ASEE, 2014). He was awarded an IEEE-USA Professional Achievement Award (2013) for designing the B.S. degree in engineering education. Reid is a Co-PI on the "Engineering for Us All" (E4USA) project to develop a high school engineering course for all. He is active in engineering within K-12, (Technology Student Association Board of Directors) and has written multiple texts in engineering, mathematics, and digital electronics. His email address is kenreid@vt.edu.*

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# *Call For Papers*

*The Journal for Quality Perspectives in Knowledge Acquisition* (JQPKA) is a double-blind, peer-reviewed journal that serves a triumvirate of educational research needs: Higher Education; Workforce Development and training in all fields: (education, business, medicine, science, law) and K-12. *If you are doing something innovative, interesting, and of benefit to the education community, JQPKA wants to know.* We are interested in articles from diverse disciplines, which are research-intensive and also case study-focused. Methodologies can include quantitative, qualitative, and mixed method approaches.

Continuing research and exploration of innovations that lend to continuous process improvement and quality enhancements in the field of education, as education relates to all disciplines and all organizations, are critical, especially during these challenging times that have required modifications in the educational/business delivery modality; crisis management plans; supply-chain reconfigurations; enrollment crises in higher education on both the community college and university levels; academic program excision; impacts on reductions in state budget allocations; concerns regarding the quality of mathematics, science, and English proficiency skills taught on the K-12 level; teacher preparation programs; Ph.D. attrition/retention; graduate advising; preparation for directing dissertations/theses/special projects; the ethics of doctoral advising and writing support; community college collaborations with universities and high schools to support advanced degree initiatives; STEM internships and business co-ops; accelerated academic programs, among others. Many of these issues relate to the challenges of student retention, career preparation, success, and degree completion on all levels. The disciplinary practice of education is undergoing stimulating changes that educators in all fields, as innovative change agents, must be prepared to address, and the conduit to these changes lies in the collaborations and the learning communities that educators create in an effort to implement purposeful change via their research.

JQPKA is interested in providing such researchers with publication opportunities in an effort to disseminate their findings to all education practitioners. Research findings that relate to any of the elements expressed above, as well as all elements that interface with the enhancement of learning within all learning facets, are all welcome topics.

If you are uncertain if your topic aligns with JQPKA's publication interests, please send an abstract to the Editor, Dr. Marianne Di Pierro at her email address: JQPKAEditor@gmail.com or marianne.dipierro@wmich.edu

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# *Author Guidelines*

***The Journal for Quality Perspectives in Knowledge Acquisition (JQPKA)*** is a double-blind, peer-reviewed journal that is published online by the Education Division of the American Society for Quality (ASQ). The Journal engages the education community in an academic, scholarly conversation regarding significant topics related to continuous process improvement and the identification of best practices through which quality is anchored. The Journal considers manuscripts that have not been published previously and that are not under consideration elsewhere.

**Topics of Publication Interest:** JQPKA publishes manuscripts of interest to educators in a diverse spectrum of disciplines. It serves a triumvirate of educational research needs: Higher Education; Workforce Development and training in all fields: (education, business, medicine, science, etc.), and K-12. The Journal welcomes manuscripts that encompass innovative techniques, applications, theories, ideas, approaches that are of benefit to the community of educators. *We are interested in articles from diverse disciplines which are research-intensive and also case study-focused and that intersect with any aspect of quality and quality performance in education and that are evidence-based.* Methodologies include quantitative, qualitative, and mixed method approaches. Some examples of potential topics include the following: curriculum reform to enhance student learning outcomes; applying improvement science within teacher preparation programs; incorporating biomedicine and engineering in the Ph.D./MD curricula to solve complex interdisciplinary health problems (tensile strength of sutures in ligament repair, printing bone, analysis of leukocyte extravasation); teaching in the 21st century learning environment; workforce development in hospital systems using Vascular Access Specialist Teams (VAST); employing the Malcolm Baldridge Criteria for Performance Excellence within the university system; community college partnerships with universities and high schools to further advanced degrees, among many others.

## General Information: MANUSCRIPT FORMAT

**Manuscript Word Length and Formatting:** Manuscripts submitted to JQPKA should be between 3,500-5,000 words, written in Times New Roman (12 Font); submitted only as a Microsoft Word document; and formatted in APA style, 6th Edition. The manuscript should contain an Abstract, as well as Key Words that reflect its content. It is recommended that authors/co-authors submit final working drafts to a professional editor prior to submission to JQPKA to ensure that their manuscripts are prepared according to these specifications, as well as those that appear under the **Manuscript Content Considerations** heading in this document.

**Figures, Tables, Charts, Diagrams, Illustrations, Photos:** No more than three (3) may be included in a manuscript. Prepare figures, diagrams, charts, illustrations only as PDFs and in no other format. Tables are to be formatted in Microsoft Word. *All figures, tables, charts, diagrams, illustrations, and photos are to be created as separate files, and are not to be included in the manuscript that is being submitted, nor are they to be included at the end of the manuscript.* Make certain to clearly label all figures, tables, charts, diagrams, illustrations, and photos with their correct number and title, and center this information at the bottom of the respective figure, table, chart, diagram, illustration or photo. Also, indicate in the manuscript the placement of these elements, and highlight using Red highlighting. For example:

PLACE FIGURE 3 HERE
Figure 3: Nationwide Doctoral Attrition

PLACE TABLE 1 HERE
Table 1: Annual Review Policies by Department

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# *Author Guidelines*

## MANUSCRIPT CONTENT CONSIDERATIONS:

Writers should ensure:

- Research expressed in the manuscript makes a contribution to the discipline.
- Methods applied align with the research questions and answer them.
- Manuscript reflects methodological and conceptual rigor.
- Outcomes/findings result logically and accurately from the data.
- Thesis of the manuscript is met.
- Figures, tables, charts, diagrams, illustrations actually demonstrate key narrative points.
- Manuscript is well-organized, readable, clear in presentation, and error free.
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- Internal citations in the narrative align with the references.
- Educational practitioners can benchmark against this study if they so choose.
- Terms are fully identified in the first reference prior to the use of acronyms for this term.
- Use of jargon has been eliminated from the manuscript.
- Exact names of the author/co-authors appear on the manuscript in the exact preferred order.
- Definitions of terms are provided to enhance readers' understanding of concepts.

## OTHER REQUIREMENTS:

Along with their manuscripts, authors and co-authors are asked to submit a headshot photo (in jpg ONLY), as well as a brief biography of no more than 100 words. *These 2 documents (Photo and Bio) are to be submitted as 2 separate documents: Please do NOT combine them into one document.* Please ensure that all bios reflect the authors' highest credential: Ph.D., Ed.D., MA, MS, etc.

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