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Improvement Science as a Frame for the Dissertation in Practice: The Johns Hopkins Experience

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ABSTRACT

The Johns Hopkins University Doctor of Education program was developed with the expressed program outcome of developing leaders who possess the knowledge, skills, and dispositions to rigorously examine educational problems of practice with stakeholders within their context of professional practice using a social justice lens. The purpose of this article is to describe how improvement science principles depicted by Bryk et al. (2015) served as a frame for our Applied Dissertation to support scholar-practitioners to partner with their colleagues in educational institutions and to independently take on the challenges and opportunities they will encounter in their future work. We outline the dissertation through a discussion of these principles and provide three examples of the resulting dissertations and their impact on the scholar-practitioner's context of professional practice and on them as educational leaders.

KEYWORDS

applied dissertation, dissertation in practice, improvement science, scholar-practitioner

Rather than a doctoral program that sends education professionals out to transform education from the top-down, our Doctor of Education (EdD) program holds the goal of developing leaders who study, observe, and work in partnership with their colleagues to improve and transform their professional contexts from the inside out. From the preadmissions identification of the Problem of Practice (POP) to the development of the context-based needs assessment study, the examination of the problem from multiple disciplinary and theoretical lenses, and the design of pilot solutions, our students engage in a doctoral journey that helps them develop their educational diagnostician knowledge, skills, and insights. Rather than outsiders telling insider educators what they should do, our program has evolved into one that facilitates the doctoral journey so that our graduates can accurately identify educational problems and opportunities for growth within their organizations, understand the systems within which those problems and opportunities are situated, decipher between the driving factors that are immediately actionable, and calibrate and design potential solutions and policies to pilot, test, improve, and examine both the process of implementation as well as the outcomes of their intervention for participants. Not only are the voices, opinions, and experiences of the doctoral students valued in the development of their applied dissertations, but the voices, opinions, and experiences of their practitioner partners are essential in the doctoral journey. Our program did not reach this point all at once, this evolution occurred across the first years of the program as we examined, revised, and improved our own program each year, with each new cohort of students, to facilitate the best doctoral experience as our student population continued to grow in diversity of personal backgrounds and professional contexts.

The Johns Hopkins University (JHU) School of Education revised its EdD degree program in 2012. Prior to this time, the goal of our face-to-face EdD program was the development of scholars for academic positions. Thus, the program was structured and initially functioned similar to Doctor of Philosophy (PhD) programs. To distinguish this newly conceived EdD from the PhD, we evolved the program to reflect the important work of scholar-practitioners. We established a coherent curriculum provided to our candidates in a cohort model with wrap-around support services to ensure student

success. The EdD was established to be completed online in three and a half years with the expressed goal of supporting the transition of practitioners to scholar-practitioners who had the knowledge, skills, and dispositions to deliver educational change in a variety of settings. In fall 2012, a faculty committee engaged multiple stakeholders to envision a program that would powerfully grow and enhance the practice of the educational leaders who enrolled and thereby engender growth and improvements in and with their professional organizations.

We focused our initial brainstorming efforts on structuring the program using the guidelines set forth by the Carnegie Project on the Educational Doctorate (CPED, n.d.) combined with our beliefs in an interdisciplinary foundation. The final product reflected several CPED Guiding Principles, including creating positive change for individuals and communities, providing field-based opportunities to explore contextualized problems, and grounding the doctorate in practical and research knowledge to foster strong profession knowledge (CPED, n. d.). In this way, the EdD evolved to be more integrated and coherent, more contemporary, and more relevant to the authentic work of those involved in an array of education-related endeavors. Furthermore, and surely a foreshadowing of needs to come, the program format was imagined as a virtual experience to extend to a worldwide pool of inspired leaders in education seeking a program that offered greater accessibility with faculty poised to teach an international audience of learners and change agents. Finally, unlike the traditional doctoral dissertation, the group imagined an Applied Dissertation that focused on a significant POP within the doctoral student's context of professional practice.

The POP is the underlying issue identified by students, in agreement with their professional partners in practice, through ongoing observation as they have worked within their context of professional practice. To ensure the support of the organization and to ensure that the POP matched the concerns of the organization, the students identify an Executive Sponsor within their organization who supports the student in navigating organizational barriers. Thus, our graduates are prepared to set a high standard for transformational leadership in education, to apply evidence-based practices to improve educational outcomes, and to meet the vast challenges associated with improving learning outcomes in both public and private educational environments. The purpose of this article is to describe how improvement science principles depicted by Bryk et al. (2015) served as a frame for our Applied Dissertation to support scholar-practitioners to gain the knowledge, skills, and dispositions necessary to partner with their colleagues in educational institutions and to independently take on the challenges they will encounter in their future work, which reflects the third CPED Guiding Principle. We provide evidence of these journeys through three stories of our graduates' transformation from their voice and perspective.

THE JOHNS HOPKINS UNIVERSITY EDD APPLIED DISSERTATION

The JHU EdD was designed to develop scholar-practitioners' knowledge, skills, and dispositions to intensely investigate educational problems of practice and affect consequential and targeted outcomes in education-related enterprises such as software development, instructional design, private for-profit and not-for-profit professional development organizations, as well as PreK-16 educational contexts. To do this, we developed the program with several goals for students' learning, including understanding the system in which POPs are situated, empirically examining the factors associated with the POPs using rigorous mixed methods research designs to ensure that their intervention accurately reflects the needs of their context, synthesizing literature to understand the potential of interventions given the variation of contexts in which the interventions are enacted, and rigorously understanding both the impact of the intervention on stakeholders as well as proximal outcomes.

The JHU EdD scholar-practitioner doctoral journey was established on a melding of research and practice. Specifically, research outcomes for students involve evaluating and synthesizing extant literature; empirically exploring the contextualized POP; identifying, crafting, and executing an intervention; gathering, organizing, analyzing, and translating findings; and sharing results of their change project as well as an assessment of their approach. The JHU Applied Dissertation was designed to provide evidence of a doctoral student's ability and knowledge of the skills necessary to frame an important educational issue, build relationships within the organization to be able to implement an intervention, and evaluate both the process of implementing an intervention as well as outcomes of this intervention.

Improvement Science as a Frame for the JHU Applied Dissertation Journey

In their description of the evolution of the EdD within CPED, Perry and colleagues (2020) discuss early conversations about the distinguishing features of the Dissertation in Practice (DiP) as it would be termed. Several central tenets were agreed upon, "the major focus should be problems of practice, the research should be applied, and development of the product should be built throughout and across coursework" (p. 1). This focus was intended to develop the requisite expertise to effectively impact change in educational organizations as a direct result of the scholar-practitioner's doctoral training. The expressed goal of the JHU EdD was that they would replicate the process of their dissertation beyond the program to examine and intervene with intractable issues observed within the workplace. Thus, they would avoid what Bryk and colleagues (2015) call "solutionitis, [which] is the propensity to jump quickly on a solution before fully understanding the exact problem to be solved" (p. 24).

To achieve the goals of the program, we used Bryk and colleagues' (2015) principles of improvement science as an explicit framework for our dissertation. This use of improvement science in what Perry et al. (2020) call a "new mindset and a new dissertation frame" (p. 23) helped us to evolve the focus, nature, and final product of the dissertation within our EdD program. The first principle of improvement science requires that we "*make the work problem-specific and user-centered"* (Bryk et al., 2015, p. 21). The JHU program instantiates this principle by focusing on a POP that emanates from the student's direct and lived observations within their context of professional practice. This principle is implemented as part of the JHU admissions process. Students begin their doctoral journey by submitting a personal statement and video responses to questions in their admissions application that describe a significant POP, indicate its importance within education generally as well as specifically in the applicant's context of professional practice, provide initial thinking about factors that may contribute to the POP, situate

their work in a social justice perspective, and articulate how the POP aligns with the candidate's chosen area of specialization. These specializations are four-course sequences that provide depth in content and research in one area. These specialization areas, including *Mind, Brain, and Teaching; Entrepreneurial Leadership in Education; Urban Leadership; Instructional Design and Online Teaching and Learning;* and *Technology Integration in K-16 Education*, are a unique feature of the JHU EdD program. Our students apply to and engage in specialization courses as a cohort.

During the first year in the program, our doctoral students develop and refine the POP. Program documents shared with students as a resource define three main elements of the POP statement: (1) the broad problem in society; (2) at least three evidentiary statements of the problem, including citations that provide evidence the problem exists in various forms; and (3) how this problem manifests itself in their professional context. In addition, they focus on providing a rationale for the importance of the POP and establishing the POP broadly through the research literature as well as locally through systematic observation and data collection within their professional contexts. Once the problem has been established, students investigate factors associated with or potentially contributing to the POP from integrated disciplinary and organizational perspectives. This examination of the literature is framed using systems approaches such as an Ecological Systems Theory (e.g., Bronfenbrenner, 1994; Bronfenbrenner & Morris, 2006; Neal & Neal, 2013) or related systems perspectives (e.g., Cabrera & Cabrera, 2015; Cabrera et al., 2015), which mirrors the systemic and systematic inquiry reflected within the CPED Guidelines (CPED, n. d.). This focused literature review presents a conceptual framework that proposes interrelationships between the POP and a select number of key factors to establish a rationale for the empirical needs assessment study. The first-year courses also challenge students to investigate their POP from multiple disciplines, including historical, economic, anthropological, and sociological lenses as well as various learning theories. Finally, students are introduced to the principles of improvement science (Bryk et al., 2015) as a frame for thinking about a potential process for their dissertation. All of this work results in the first chapter of their dissertation, a synthesis of the literature examining the factors related to their POP.

Students' work to understand their POP and associated factors is also user-centered as they conduct a needs assessment study (Chapter 2 of the dissertation) in their professional context to empirically describe the salient factors from the literature synthesis. Students gather empirical evidence through systematic observation, existing data analysis, and the collection of new data to describe the POP and to understand how the potential contributing factors are functioning within their context of professional practice. This examination of the POP supports students' understanding of the second principle of improvement science, *"focus on variation in performance"* (Bryk et al., 2015, p. 35). Through the needs assessment study, students explore the extent to which factors in the literature are manifested within their contexts and under what conditions. By situating the POP within their context of professional practice, this approach allows the practitioner to recognize the variation within their system and the variation between the factors in empirical studies' contexts and their own contexts. Together the synthesis of the literature related to the factors that potentially contribute to the POP and the empirical study to describe the factors within their professional context supports the students to *"see the system that produces the current outcomes"* (Bryk et al., 2015, p. 57), the third principle of improvement science.

Finally, the students' work is problem-focused and user-centered by focusing the intervention on the factors in the context of professional practice that may be amenable to improvement based on the practitioners' position in the organization, their sphere of influence, their development of relationships and partnerships through the doctoral journey, and their empirical study of the factors that are contributing to the POP within their professional context. During the fall of Year 2, candidates begin to pursue specialization coursework as they use the factors they identified as POP contributors to pinpoint an existing or curate a bespoke intervention for their specific context, which is the focus of Chapter 3. These courses are twofold in purpose as they: 1) build knowledge of a unique specialization and 2) supply the theory and organization for the journey to revealing the final intervention for implementation. By embedding their dissertation components within their specialization courses, students can draw upon new professional knowledge and insights to collaboratively explore potential solutions with their specialization faculty members and their advisors, a hallmark of the JHU EdD journey.

The fourth principle, *"we cannot improve at scale what we cannot measure"* (Bryk et al., 2015, p. 87), and fifth principle, "*use disciplinary inquiry to drive improvement"* (Bryk et al., 2015, p. 113), are instantiated within our pre-program summer orientation research modules, three-course research methods sequence, dissertation research, and specialization courses. Measurement is central to the needs assessment study and rigorous analysis of the intervention through process and outcome evaluations.

Students begin to build their knowledge of the research process through a distinct learning experience to augment their baseline research methodology knowledge through online summer orientation research methods modules. These modules focus on two essential areas; 1) applying research in the context of professional practice and 2) building the background of the language and specific features of the three main research paradigms used by our students—qualitative, quantitative, and mixed methods. The goal is to provide students with a strong foundation to launch their coursework as we prepare them as consumers of the vast amount of research they will be exposed to within the program. These include such topics as the language of research, research ethics, conceptual and theoretical frameworks, measurement, research questions and hypotheses, and statistical analysis. Each module develops these ideas using a combination of required readings and asynchronous videos by JHU instructors.

Within their *Research Methods and Systematic Inquiry I* course, students learn the methods that are necessary to empirically examine factors that may contribute to the POP. This course provides a more in-depth look at the three major research paradigms (quantitative, qualitative, and mixed methodology), than was provided in the pre-orientation modules, and corresponding methods with respect to developing research questions, sampling, operationalizing factors, data collection, and data analysis, to name a few. In this course, students begin applying this knowledge by developing a research plan that will be implemented in the subsequent summer when students take dissertation research credits. That is, during the first summer students make progress on determining the factors from their literature review that manifest within their professional context (Year 1 Paper). Students use this

knowledge in their second year to develop a targeted intervention that addresses the contributing factors of the POP.

Within the Year 2 research courses, candidates focus on learning and applying data analysis approaches for the three research paradigms in *Research Methods and Systematic Inquiry II*. This course prepares students for their intervention study and supports the refinement of analyses from the Year 1 Paper. Students learn about parametric and non-parametric inferential quantitative analyses for experimental and non-experimental studies such as the t-test, Mann-Whitney U-test, ANOVA models, correlation, regression, and Chi-square tests to name a few. Students are also exposed to qualitative analyses focused on establishing trustworthiness such as inter-coder agreement and member checking, as well as coding using first and second-cycle approaches (Miles, Huberman, & Saldaña, 2020). The students then take what they have learned from analyzing quantitative and qualitative data and apply that knowledge to analyzing data using the mixed methods convergent parallel design. Finally, in *Evaluation of Education Policies and Programs*, students begin to consider how they will document the process of implementing the intervention and examining both the process of intervention implementation and proximal outcomes of their intervention, which is the focus of Chapter 4 of the dissertation. In this course, students learn about theories of treatment, logic models, process and outcome evaluation questions, threats to validity, and the role of improvement science and mixed methos research in conducting a process and outcome evaluation.

The third year continues the focus in a candidate's area of specialization as they write about their intervention implementation and research results (Chapter 5). In their final specialization courses, candidates develop multiple products for disseminating their findings to both practitioner and research audiences, including conference proposals, research posters, policy briefing papers, and more. These courses not only provide essential knowledge and experiences for the scholar-practitioner's academic development, but they provide products that are applicable to both their dissertation and their professional practice. The following sections provide examples of students' stories that exemplify the potential outcomes of this dissertation process.

LIVING OUT THE PRINCIPLES: EXAMPLES FROM THE FIELD

In the following section, we illustrate the dissertation process and outcomes for several of our students by providing examples of our students' dissertation stories that align with improvement principles and consider the impact of the program anecdotally on the individual and the organization in which the individual works. For each of these stories, we point to the ways in which elements of these projects exemplified the improvement science principles.

Rachna Shah, Special Educator, India

Dr. Rachna Shah was a special educator within a special needs private school in an urban district in India. The students' profiles ranged from mild to moderate disabilities, including Learning Disabilities, Autism Spectrum Disorder, Cerebral Palsy, Attention Deficit Hyperactivity Disorder, Down Syndrome, Fragile X, and others. Within this context, students' English comprehension achievement revealed consistently low outcomes over a three-year period. Further, many students were not making progress despite the inclusion of improved English comprehension as a goal of their individual education plans. A mixed methods needs assessment study was conducted with 24 students, 4 special educators, and 30 parents. The student researcher examined students' comprehensive exam scores, teachers' self-efficacy, beliefs about the role of the learner and teacher in the learning process, and parents' perceptions of the home literacy environment. The review of literature informed the factors explored. The needs assessment results indicated teachers' instructional practices and beliefs hindered students' English comprehension achievement. These factors were targeted by the intervention.

The intervention was implemented with nine English Language Arts (ELA) teachers and included modifying the current traditional workshop-oriented professional development model (with insufficient teachers' active participation, fixed schedules, and lack of follow-up support structures embedded within the teacher's classrooms) to embed it in constructivist principles, which emphasized the active involvement of participants (Desimone, 2009; Guskey, 2002; Ng & Tan, 2009). In addition, the model offered the ELA teachers at the school opportunities for reflection (Farrell & Ives, 2015; Schön, 1983) using three different platforms, participant-driven workshops, professional learning community meetings, and coaching sessions.

The findings revealed that teachers regarded the intervention PD sessions as positively impacting their reflective practices, increasing their awareness of discrepancies between their beliefs and classroom practices, and enhancing their perceptions of knowledge and skills in constructivist teaching and learning. This further led to significant changes in teacher's beliefs from traditional to more constructivist approaches and self-efficacy when compared to the needs assessment findings. Further, the teacher's classroom practices improved as examined using an observation protocol based on the Danielson Framework (Danielson, 2013).

Dr. Shah commented the following in an email reflecting her experience through the dissertation:

> The study allowed school leaders and teachers to better understand the associated drivers of the stagnant and low reading comprehension of students. It allowed me to plan the intervention based on research findings rather than assumptions. It significantly influenced the school's approach to PD as the focus shifted from content delivery to teacher's beliefs about learning and teaching. As a result, the school substituted the traditional workshop model of PD to incorporate active learning opportunities. Also, the PLC meetings were extended beyond the English department to other subject areas. The coaching sessions also continued after the study, as the teachers and leaders found coaching to positively influence the teacher's beliefs and instructional practices. The intervention also highlighted the need to redesign the preservice teacher training program to address teacher's beliefs and efficacy. Personally, the study revealed the need for data collection prior to intervention, the importance of addressing implicit factors (teacher's beliefs) to improve pedagogical practices in the classroom, and provided me with several opportunities to appreciate a research-based approach in learning and teaching (R. Shah, personal communication, September 4, 2020).

Dr. Shah's professional context includes students whose learning needs require the special education staff to "*focus on*

variation in performance" (Bryk et al., 2015, p. 35), the second improvement science principle, rather than focusing on an average success score of one general type of intervention. Because students' needs are highly diverse amongst this school population and the classroom settings were each unique systems, the intervention integrated an adaptive approach that included a variety of options. While the foundational content of the PD remained consistent, the modality of supporting teachers' learning and practice improvements varied based upon their needs. This multi-tiered approach to supporting teachers' professional learning illuminates how a *"focus on variation in performance"* (Bryk et al., 2015, p. 35) can help schools adapt interventions to specific contexts rather than apply a generic solution to a problem. Further, this study exemplified the fourth and fifth improvement science principles, *"we cannot improve at scale what we cannot measure"* (Bryk et al., 2015, p. 87) and *"using disciplined inquiry to drive improvement"* (Bryk et al., 2015, p. 113). Through a rigorous mixed methods research design, Dr. Shah was able to show a significant change in teacher's beliefs from traditional to more constructivist approaches, improved self-efficacy, and improved classroom practices as examined using the Danielson Framework (Danielson, 2013).

Jacob Giessman, Assistant Principal, Maine

Dr. Jacob Giessman was an Assistant Principal in Maine when the issue of disciplinary disparities surfaced within his school. There was an over-representation of Black male students involved in school disciplinary matters, and he was particularly concerned because discipline within the school was part of his role. During his needs assessment study, he examined quantitative disciplinary data to establish that Black males were over-represented, and this over representation was not explained by other demographic factors such as free and reduced lunch or English Language Learner status. This finding raised the question about some common internal narratives excusing the problem. Through his needs assessment study, he highlighted for the school community that staff attributed the problem to cultural differences although students attributed it to adult racism and sexism, which he reported wasn't very easy for the adults to hear or process. For his intervention, he worked with various stakeholders and allies to help students and families assert culturally responsive behavioral norms that they believed in for themselves. The intervention resulted in a set of guidelines for behavior that emanated from the students and families themselves. These guidelines continued to evolve as a frame for the disciplinary system within the school.

In follow-up communication, Jake reflected that it was misguided to accept the adult narrative and to make student stakeholders do the labor of articulating and executing solutions. The dissertation was a personal journey for Jake as he explored both his work as Assistant Principal and the community's reactions to this ongoing examination of the school community and its disciplinary practices. He reported the following about the work the year follow completion of the dissertation.

> We regrouped as a school the following year and tried a slightly different tactic, engaging a wide variety of stakeholders in crafting culturally responsive behavioral norms that apply to all stakeholders, including teachers and staff. This is happening in tandem with ongoing equity trainings and is part of a general troubling of the concretized power dynamic between adults and kids in our school. I would say that the dissertation was one in-depth and formalized step in an ongoing iterative process. Where it didn't affect the change it hoped for, it at least shook up problematic narratives. It certainly brought the topic of discipline disparities to the community table repeatedly over the course of several years and primed the community to engage ever more deeply with the problem. The project was yet another impactful professional moment of destabilizing my worldview. It repeatedly unsettled me in ways that I needed to be unsettled. It made me more conscious of what I don't know, what I am at risk of getting wrong, and what I need to dig into. I came into the program ready to write a theoretical or critical dissertation. Having to ground it in actual action in the field was an important stretch for me. It would have been much easier to read a bunch of things and just saying something smart about them. I appreciated that the JHU applied dissertation JHU Applied Dissertation didn't let me off that easy. I also appreciated the level of rigor that was expected. (J. Giessman, personal communication, February 3, 2021)

Dr. Giessman's doctoral journey allowed him to examine the disparities in the disciplinary outcomes data and find an overrepresentation of Black students experiencing disciplinary penalties. Rather than design an intervention to address student behavior, Dr. Giessman explored the perceptions of this situation from different levels of the system, which included the educators', students', and parents' perceptions. These opposing opinions about the causes of the disparities in disciplinary outcomes provided an opportunity for the school community to better *"see the system that produces the outcomes"* (Bryk et al., 2015, p. 57), an example of the third principle in practice. These opposing opinions about the causes of the disparities in disciplinary outcomes provided an opportunity for the school community to *"focus on variation in performance"* (Bryk et al., 2015, p. 35) to better *"see the system that produces the outcomes"* (Bryk et al., 2015, p. 57), an example of the third improvement science principle in practice. Seeing the system factors allowed Dr. Giessman to begin "an ongoing iterative process" of dismantling and destabilizing former ways of thinking, knowing, and acting between teachers and students, an approach that he may not have taken without the Applied Dissertation work. Thus, the systems approach allowed Dr. Geissman to catalyze an ongoing community change process toward a more culturally responsive and socially just school community.

Razia Kosi, Facilitator, School District Office of Diversity, Equity and Inclusion, Maryland

Dr. Razia Kosi began her career as a social worker in a Mid-Atlantic public school district where she currently is employed. She is an immigrant who came to this country as a child and is the first woman in her family to attend college. She spent the last 15 years leading cultural proficiency professional learning teams and at the start of her EdD program at JHU, she was a facilitator in the district's newly formed Office of Diversity, Equity, and Inclusion. The district, along with the nation, was grappling with understanding and changing the impact of systemic racism in education. The district's focus on the achievement gap was unfortunately contributing to a deficit mindset in which Black and Brown students and their families were viewed as problems that needed to be fixed rather than

examining the district's systemic barriers affecting educational outcomes.

From the needs assessment study, she identified evidence of a lack of understanding about the historical context and current policies supporting systemic racism. These results pointed to the district's educational leaders needing to increase their understanding of the systems of oppression and privilege affecting disparate outcomes between Black and Brown students as compared to White and Asian students. Additionally, it was important to build learning communities among school administrators so they could practice shared vulnerability through discussions about their own racial identity development and how it affects their efforts in leading their staff toward equity and racial justice. Dr. Kosi developed a professional learning intervention during the dual pandemics of racial injustice and COVID-19 that built on the three areas of cultural competence, equity, and social justice. The face-to-face sessions shifted to a summer virtual experience for 21 school administrators to change from initial self-awareness to collective efficacy.

The study resulted in the following findings: (a) school administrators reported a need for additional professional learning on equity and social justice, (b) transformative learning increased both the participants' engagement and culturally proficient leadership practices, (c) reflecting on racial identity development increased leaders' understanding of how racial identity affects their leadership and the students' experiences in schools, and (d) professional learning communities among school administrators offer a vital opportunity for leaders to increase collective efficacy in discussing racial justice and equity. Additionally, arts integration, through poetry writing increased the leaders' empathy and understanding of others' experiences. This activity increased the school administrators' willingness to model vulnerability with their staff to examine inequitable practices within the school and classrooms.

In an email from Dr. Kosi, she stated:

> The JHU EdD experience was one of the most challenging and rewarding endeavors I have participated in. One unexpected benefit was how well-prepared I was to adjust to a virtual learning environment during the 2020-21 COVID 19 pandemic. I shared tools and strategies to engage participants with online professional learning. We were even able to have conversations about highly sensitive issues, such as discussing race and racism. My own intervention for my study had to quickly pivot from a face-to-face PD to wholly online within a matter of weeks. I was able to revamp the training using the online tools and best practices for adult learning. The courses in the Entrepreneurial Leadership in Education program specialization better prepared me to co-author and lead state and district policy on educational equity, which codified the important changes needed to actualize equity in our district and state. Mixed methods research has influenced how I support administrators in their Leadership Fellows projects and professional learning. The administrators see the value in talking with students and staff to collect qualitative data and give voice to the quantitative data showing disparities in student discipline and enrollment in upper-level courses. The pain and frustration expressed by the students through this data collection offers insight into the students beyond the numbers. I'm excited to be an JHU SOE Doctoral Alum, not only because it means that I completed my doctorate, but also because I (and others in my context) value what I gained from the program. (R. Kozi, personal communication, February 3, 2021).

Through her work at the school district level, Dr. Kosi conducted her needs assessment by examining perceptional data from school leaders about their knowledge and understanding of the history and the policies that were producing racist outcomes within her system. She knew that the district *"[could] not improve at scale what they could not measure"* (Bryk et al., 2015, p. 87), the fourth principle. By collecting both quantitative and qualitative data to provide a holistic view of the systemic problems, the school leaders came to a consensus on how to approach the improvement of this problem. Thus, she *"used disciplined inquiry to drive improvement"* (Bryk et al., 2015, p. 113), the fifth principle. Ultimately, this comprehensive mixed-methods inquiry catalyzed a district-wide intervention to improve personal growth, professional practices, and system-wide dismantling of racial inequities.

CONCLUSION

As we finish our 9th year of the program, we strive to embody the ideals and principles that we uphold for our students in the continual examination of the successes and challenges of our work in this program and in the development of the doctoral journey for our scholar-practitioners. Their stories illuminate how these doctoral dissertations aligned with the principles of improvement science as outlined by Bryk et al. (2015). Each of these stories depicts a POP that was the focus of the student's dissertation making each dissertation *"problem-specific and user-centered"* (Bryk et al., 2015, p. 21), the first principle. Further, the information they gained by reviewing the literature related to their POP and by conducting a descriptive empirical needs assessment study informed by this literature enabled them to *"focus on variation in performance"* (Bryk et al., 2015, p. 35) within their contexts, the second principle. These activities supported the scholar-practitioner to *"see the system that produces the current outcomes"* (Bryk et al., 2015, p. 57), Bryk and colleagues' third principle. Finally, each of these stories was embedded within a rigorous process and outcome evaluation, which exemplify the fourth and fifth principles, *"we cannot improve at scale what we cannot measure"* (Bryk et al., 2015, p. 87) and *"use disciplinary inquiry to drive improvement"* (Bryk et al., 2015, p. 113).

The sixth improvement science principle, *"accelerate learning through networked communities"* (Bryk et al., 2015, p. 141) has been more elusive to instantiate. In a couple of instances, groups of students have been working together with some advisors in structures that approximate networked improvement communities (NICs). This model is being piloted within the program to allow some groups of students to share resources such as instruments so that we may be able to draw stronger connections across dissertations leading to more generalizable outcomes. Through this pilot of the NICs, we hope to explore how building networks of students focused on improvement within sectors of the educational enterprise may nurture the relationships and structures that will lead to far-reaching educational improvement amongst and between our graduates.

We will look to these students' stories, their narratives, and their insights to help partner with us in the growth and improvement of our own organization to continue to point the way forward in our contributions to the field of education and educational organizations

around the world. Our work provides several important implications for the field that exemplify the principles of improvement science. To enact such projects, students need to be supported early in the program to examine their POP within their context well. This is often problematic as students' research acumen is nascent when they begin the program. We have struggled to strike the right balance within the research methods sequence between the needs of the scholar-practitioner and the canon of the research community. Other programs are encouraged to consider the types of research methodological training needed to support scholar-practitioners across their careers. We have found the sequence of experiences, however, to be powerful for our students who report that their professional work becomes "dissertation like" as they emerge from our program. We have learned through their challenges and successes that this principled approach to applied scholar-practitioner work can not only result in improvements in education in general, but also contribute to dismantling systems of oppression and constructing socially just education communities.

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