Using Design Research Thinking and Data-Teaming Processes to Transform Educators' Professional Practice:
A School Improvement Case Study

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Abstract

Educational design research has emerged in recent years as a powerful applied methodology within the school improvement literature that holds considerable potential for expanding and enhancing educators' context-specific teaching and learning improvement efforts. This article explores how K-12 school leaders can apply core tenets of design research–based school improvement thinking in conjunction with practical data-teaming processes to accurately identify and address underlying, root-causal problems associated with educators' professional practice that can often fuel persistent student-learning problems in elementary and secondary school contexts. One hypothetical school improvement case study, serving as a case exemplar of the applicability of the customized "design-based school improvement data-teaming" approach advocated in the article, is highlighted. A literature-informed discussion, organized within three relevant areas of transformative school improvement practice and examining salient aspects of the profiled case study and associated educational design research results and findings, is then presented. Finally, a number of practical leadership strategies to support educators' design-based school improvement data-teaming practices in real-world school settings gleaned from the discussion are offered.

Key Words: Educational Design Research Methods; Design-Based School Improvement; Data Teaming Collaborative Inquiry; Problem of Professional Practice Interventions

Introduction

A substantive amount of writing has appeared in the school improvement literature in the past two decades on the importance of utilizing various highly touted data mining and analysis techniques and intervention strategies as means for school leaders (campus-level principals, assistant principals, content area department chairs, academic team lead teachers, etc.) and their instructional improvement teams (typically comprised of grade-level teachers, instructional coaches, school guidance counselors, etc.) to identify and address persistent student-learning problems in elementary and secondary school contexts. This literature has focused on a number of salient topic areas associated with the kinds of student learning improvement challenges school leaders routinely confront in today's schools.

These topic areas typically include, but are not limited to, teaching and learning improvement challenges such as: 1) providing for the differentiated learning development and support needs of increasingly diverse populations of students (Gaitan, 2004; Theoharis, 2009; Theoharis & Brooks, 2012); 2) increasing teachers' knowledge and understanding of culturally responsive pedagogy and culturally responsive teaching practices (Brown, 2004; Gay, 2000, 2002; Sapon-Shevin, 2003, 2007; Sheets, 2005); 3) integrating instructional technology tools effectively into classroom-based instruction (Collins & Halverson, 2009; Ertmer & Ottenbreit-Leftwich, 2010; Hunter, 2015; Khan, 2012; Levin & Schrum, 2012; McLeod & Lehmann, 2012; Militello & Friend, 2013; Prensky, 2008, 2010; Richardson, 2010; Schrum & Levin, 2015; Sheninger, 2014; Tapscott, 2009); 4) incorporating Next Generation Science Standards (NGSS) (National Academy of Sciences, 2012) into STEM (science, technology, engineering, and mathematics) and STEAM (science, technology, engineering, arts, and mathematics) curricular designs and instructional programs (Larmer, Mergendoller & Boss, 2015; Martinez & McGrath, 2014; National Research Council, 2011); 5) assisting teacher teams in learning how to engage in appropriate collaborative data mining and disaggregated data analysis activities to identify students' specific learning problems (Bambrick-Santoyo, 2010; Blanc, et al. (2010); Boudett, City & Murnane, 2010; Bowers, Shoho & Barnett, 2014; Coburn & Turner, 2012; Cosner, 2012, 2014; Goldring & Berends, 2009; Mandinach & Honey, 2008; Nabors Olah, Lawrence & Riggan, 2010; Venables, 2014; White, 2011); and 6) providing teachers with data teaming "how-to" strategies for developing targeted teaching and learning interventions to address individual students' identified learning improvement need areas (Allison, et al., 2010; Bernhardt, 2013; Heacox, 2002; Love, 2009; Love, et al., 2008; Peery, 2011).

Additionally, in recent years a practical methodological literature has also emerged articulating and advocating for the merits of a new method of investigation falling within the genre of improvement science called *educational design research* (McKenney & Reeves, 2012; Plomp & Nieveen, 2010; van den Akker, McKenney & Nieveen, 2006). Educational design research—a distinctive form of improvement science research that can be distinguished from other forms of established scientific inquiry—involves education stakeholders working collaboratively *within their own organizational contexts* to explore and analyze challenging (often complex) problems of educational practice as a concerted means to generate *both conceptually-grounded insights and practical solutions to real-world problems.* Thus, education stakeholders—working together as research teams in context-specific school situations—become education design researchers through adopting and applying education design techniques in order to accurately identify, address, and solve persistent problems of teaching and learning improvement practice in their educational organizations. As such, education design researchers are focused fundamentally on the production of immediately "usable knowledge" that can inform the improvement of teaching and learning in their own educational contexts. As McKenney and Reeves (2012) emphasize: "Educational design research is particularly concerned with developing what Lagemann (2002) referred to as usable knowledge, thus rendering the products of research relevant for educational practice. Usable knowledge is constructed during the research (e.g., insights among the participants involved) and shared with other researchers and practitioners (e.g., through conference presentations, journal articles and the spread of interventions that embody certain understandings). Because educational design research is conducted in the naturally occurring test beds of school classrooms, online learning environments, and other settings where learning occurs, these studies tend to be methodologically creative. Multiple methods are often used to study phenomena within the complex systems of authentic settings, thus possessing high degrees of ecological validity. In an ecologically valid study, the methods, materials, and setting of the study approximate the real life situation that is under investigation (Brewer, 2000)." (McKenney & Reeves, 2012, pp. 7-8) Moreover, methodological commentators have described the educational design research process using multiple descriptors, including characterizing education design research as being: adaptive, collaborative, contextual, flexible, goal-oriented, grounded, integrative, interactive, interventionist, iterative, methodologically inclusive, multilevel, pragmatic, process-focused, theoretical, transformative, and utility-oriented (see: Cobb, et al., 2003; Kelly, 2003, 2006; Reinking & Bradley, 2008; van den Akker, McKenney & Nieveen, 2006; Wang & Hannafin, 2005).

Significantly, educational design research studies—as described by proponents of this research genre—are planned, conducted, and evaluated by education practitioners who are focused intensively on generating solutions to complex teaching and learning problems in order to positively impact and transform educational practice (Plomp & Nieveen, 2010). In educational design research studies, these solutions typically take the form of "design interventions" that context-based research team members generate and implement to directly improve educational practice. These interventions consist of systematic programs of change-inducing activities and procedures intended to: 1) broaden and deepen educators' knowledge acquisition; and 2) enhance educators' individual and team-centered professional skills development and pedagogical understandings.

The intervention design development process is informed by insights education stakeholders (working as design research teams in their own organizational settings) glean through engaging in collaborative data analyses and reviewing relevant theoretical and practitioner literature related to aspects of the identified learning problem. Thus, as a research methodology, educational design research specifically involves education practitioners working "…to design and develop an *intervention* (such as a new [curricular or instructional] program, teaching/learning strategies and materials, products and systems) with the aim to solve a complex educational problem and to advance our knowledge about the characteristics of these interventions and the processes to design and develop them." (Plomp, 2010, p. 12) Additionally, the educational design process often involves practitioner design researchers engaging together as a collaborative design team in a four-step process, consisting of: 1) identifying and analyzing a problem of practice; 2) developing prototype solutions to the problem informed by relevant theory and concepts from various practitioner literatures, existing design principles, and innovative professional learning strategies; 3) engaging in iterative cycles of testing and refinement of the solution or solutions to the identified problem; and 4) reflecting retrospectively as a design team to generate "design principles" and enhance problem solution implementation in practice (Mintrop, 2016; Plomp & Nieveen, 2010). Notably, as a research methodology, educational design research has continued to evolve to become a preferred method of choice for more and more education practitioners working in elementary and secondary school settings who are interested in collaborating together in systematic, practical ways to identify and address problems of teaching and learning practice.

Purpose

The purpose of this article is to demonstrate how educational design research—as a practical research methodology—can be *applied systematically* by educator teams working together in context-specific elementary and secondary school settings to generate new insights and understandings that can enable educators to realize substantive improvements in their own professional teaching and learning practices. In the sections that follow, I first provide an overview of one especially noteworthy and highly-refined version of the educational design research method—the *Design-Based School Improvement Logic Model and Operational Steps Process* articulated by Rick Mintrop (2016)—and illustrate how teams of school practitioners can utilize Mintrop's particular design-based school improvement *thinking* and associated operational steps *process* to generate meaningful new understandings about the "root causes" of their students' learning problems and, in doing so, design and implement targeted professional learning intervention programs to transform educators' own professional practice. In a subsequent section, I then present a "design-based school improvement case study" showcasing how the instructional improvement team in the school case situation (consisting of the campus principal and multiple grade-level teachers and related education personnel) can readily apply Mintrop's design-based school improvement model and operational steps process in tandem with actionable, data-teaming strategies in their own school setting to: 1) glean important, data-informed insights on the underlying, root causal *context-specific problem of professional practice* that is actually fueling their campus's identified student learning improvement challenges; and 2) generate and implement a focused *instructional improvement intervention design* to transform educators' professional practice.

Methods

The design-based school improvement analytic thinking and operational strategies utilized in the case study presented and discussed in this article follow closely the *Design-Based School Improvement* educational design research method advocated by Rick Mintrop (2016). Some of the conceptual and operational elements incorporated into the customized "design-based school improvement data-teaming" approach utilized in the case study profiled in this article (see next section) were also drawn from: 1) the work of various education design researchers associated with the SLO Netherlands Institute for Curriculum Development (Plomp & Nieveen, 2010); 2) practical conceptual and methodological considerations involved in designing and conducting improvement-focused action research in one's own organizational setting (Coghlan & Brannick, 2014); and 3) applied methods leveraging the use of data teams and collaborative inquiry to identify and solve student-learning problems in elementary and secondary schools (Love, 2009).

As described by Rick Mintrop (2016), the Design-Based School Improvement research method directly involves the two central processes of *problem identification* (i.e., involving problem definition and problem framing dimensions) and *problem reframing*. In working to define or accurately identify complex problems in school teaching and learning environments, Mintrop argues that complex problems are often multi-leveled and ill-defined, and occur—from the perspective of problem solvers—within a mentally discernible *problem space* and *solution space*.

In discussing the concept of "problem space", Mintrop cites the thinking of Jean Pretz, Adam Naples, and Robert Sternberg: "In the problem space, problem solvers make mental representations of tasks, needs, goals, and the situation at hand. They aim to categorize a problem and thereby reduce its complexity by emphasizing the relevant aspects of the situation and ignoring the less relevant aspects. They do this by using abstractions, typifications, or schemas that help thinkers see order where randomness of behavior would otherwise prevail." (Pretz, Naples & Sternberg, 2003) The innate complexity or ill-defined nature of many problems requires that problem solvers seek to carefully define and frame a perceived problem "…to focus and structure their thinking and to function within their capacity to process information." (Mintrop, 2016, p. 37) Elaborating further on the work of Pretz, Naples, and Sternberg (2003), Mintrop states that problem solvers typically work to construct mental and verbal formulations of perceived problems: "Problem solvers make a mental representation of a problem by holding four things in their minds: the initial state of the problem; the desired or goal state; a set of allowable operators, that is, the concepts, constructs, principles, rules of behavior, and so on that apply to the domain of practice or the task environment; and a set of constraints, that is, the givens of a situation that a chosen solution strategy needs to reckon with. Condensing and organizing this information into concise verbal descriptions or visual models helps problem solvers keep in mind the complexity of a problem space. Doing so also helps in the search for solutions and in assessing the usefulness of the chosen strategies." (Mintrop, 2016, p. 37) The sets of organizational or environmental conditions within which a problem occurs become givens, constraints, or assets that problem solvers must then contend with in the *problem space*. As Mintrop, citing Allen Newell and Herbert Simon, explains, "…the structure of the task environment determines the possible structures of the problem space" (Newell & Simon, 1972). …When a problem arises, the problem space—that is, how this problem is represented in the problem solvers' minds—must reflect the structures of the task at hand and the environment that the problem is embedded in." (Mintrop, 2019, p. 38) Thus, for example, classroom-related problem spaces need to reflect the conditions of teaching in schools.

Utilizing these problem space and solution space conceptualizations as a foundational backdrop, Mintrop (2016) goes on to articulate a literature-supported **Design-Based School Improvement Logic Model and Operational Steps Process** that directly involves elucidating problem solvers' perceptual processes associated with both the *initial identification/framing* of student-learning problems and the further *refined reframing* of these learning problems in the context of educators' own ongoing professional teaching and learning improvement practices. This "initial problem identification/framing to refined problem reframing" logic serves as a practical problem-solving schema within which school leaders can navigate to accurately identify and address context-specific problems of professional practice in elementary and secondary school organizations. In essence, the Operational Steps Process presented by Mintrop (2016) that is grounded in this logic model consists of *seven practical steps* (Mintrop, 2016, pp. 143-149). Education leaders, working in a variety of elementary and secondary school environments, can work through these steps to systematically probe the underlying root causes of student-learning problems to arrive at data-supported understandings of the context-specific *problem(s) of professional practice* fueling their school's surface-level student-learning problems.

The **first operational step** of the Mintrop (2016) seven-step process involves school leaders working to generate an initial (high inference) Student-Learning Problem rationale along with an accompanying intuitive Theory of Action (If/Then) statement. School leaders generate their initial Student-Learning Problem rationale and intuitive If/Then statement based primarily on the various sets of information and observational knowledge that school leaders continually collect and review as part of their normal, ongoing professional practice work in their school setting. In the **second operational step**, school leaders conduct an exploratory needs assessment (ENA) that involves engaging in targeted collection and analyses of specific data sets that school leaders believe are relevant to the perceived student-learning problem, including but not limited to: various kinds of data fields (such as: district- or state agency–generated school academic performance measures, student demographic data, etc.); data streams (such as: classroom observations, benchmark and progress monitoring assessment data, instructional team meeting minutes, teacher interviews, etc.); and artifact data (such as: existing documents and reports). As part of this second operational step, school leaders formulate findings and conclusions that emerge logically from their various data analysis results. Then, in the **third operational step**, school leaders work to generate a refined (low inference) Problem of Professional Practice statement. Following from this refined statement, school leaders then proceed within the **fourth operational step** to generate a composite understanding of the refined (low inference) Problem of Professional Practice statement explicating this refined statement in its full dimensionality. This can simply be a bulleted list of "factors" explaining *why* the Problem of Professional Practice occurs—specifically, bulleted factors that include both "surface behavior symptoms" and "underlying root causes".

In the **fifth operational step**, school leaders then develop concise literature review summaries of relevant knowledge bases related to key aspects and dimensions (i.e., explanatory factors) of their refined (low inference) Problem of Professional Practice statement. The express purposes of this focused literature review activity are so school leaders can: 1) obtain an informed, specific literature–supported understanding of the refined Problem of Professional Practice's underlying *root causes*; and 2) narrow down and focus in on specific *change drivers* that can directly address these "root causes". Importantly, these change drivers will guide school leaders, working as action researchers, in developing a focused intervention design that includes the kinds of practical, actionable activities and strategies that can foster the intended professional learning improvements in their school or school district situation. School leaders then work within the **sixth operational step** to generate a refined Theory of Action (If/Then) statement—a statement that is based on results of the review of selected literatures associated with the relevant professional knowledge bases targeted for review. Finally, in the **seventh operational step**, school leaders construct a Change Drivers Diagram that depicts in summary form school leaders' identified underlying, root-causal Problem of Professional Practice and the data-supported change drivers that will need to be operationalized and implemented (via a specific, actionable intervention plan based directly on the change drivers included in the Change Drivers Diagram) to realize the desired professional learning improvement goal.

In addition to the Design-Based School Improvement Logic Model and Operational Steps Process articulated by Mintrop (2016), Nancy Love and her school improvement research colleagues have put forth a very practical **Data Teaming Collaborative Inquiry** approach (Love, 2009) that school leaders (grade-level teams of teachers, instructional coaches, campus principals and assistant principals, etc.) can utilize to probe the underlying root causes of identified student-learning problems as a *team-centered, data-driven means* to design data-informed educator professional practice improvement strategies. Perhaps the most valuable contribution of Nancy Love and her colleagues' description of data-driven collaborative inquiry (data teaming) is their emphasis on the power of *root-causal data analysis* (i.e., digging deeper within relevant school learning data through using action research approaches) as a central tool in determining and verifying problem causes within the overall "Data Teaming Collaborative Inquiry" process. Root-causal data analysis, in essence, is a process by which teams of educators iteratively mine and analyze multiple levels of pertinent classroom-, grade-, and campus-level data to identify and verify the underlying root causes of students' learning problems as a means to help teachers more clearly zoom in and focus on both the "surface-level *symptoms*" (which are generally more easily discernible) and the "underlying *root causes*" (which are often much less readily apparent) of students' learning problems. This root-causal data analysis process is employed as an intentional means to more systematically and accurately inform the development, implementation, and evaluation of "targeted learning intervention" efforts—including intervention efforts centered on the improvement of teachers' own instructional practices—that are designed to address and improve students' learning. Intriguingly, these underlying "root causes" of students' learning problems can often be eye-opening for teachers, who sometimes mistakenly spend the majority (or even all) of their instructional time identifying students' "surface-level" problems (i.e., student learning "symptoms", which are relatively easier for teachers to discern in their daily teaching practices) and then work in overdrive to try to address these student learning "symptoms". Of course, as is widely documented in the school improvement literature, working exclusively or even predominantly to try to address only the "surface-level *symptoms*" of school teaching, leading, and learning problems without adequately probing/identifying the "underlying *root causes*" of these surface-level symptoms will invariably result in short-sighted, ineffective interventions—i.e., interventions that are not capable of producing "deep learning" results. Effective learning interventions must address *both* the surface-level "symptoms" and the underlying "root causes" of students' learning problems simultaneously.

Moreover, Nancy Love and her colleagues provide a strong argument for the power of data teaming as a means to dramatically reconstitute the *teaching, leading, and learning culture* of a school—and even of an entire district. One of the most striking aspects of the Data Teaming Collaborative Inquiry approach (Love, 2009) is that school leaders (campus principals, lead teachers, data coaches, etc.) working together in school environments can structure and leverage their newly formed "school-level data team" as a powerful means to nurture a fundamental shift in a school's overall organizational and instructional environment toward a decidedly *data-driven collaborative inquiry–focused* teaching, leading, and learning culture.

Interestingly, school leaders can work together intentionally as part of their data-teaming cultural change efforts to build enthusiasm for the data-teaming process among school staff by continuously talking with grade-level teachers about the *multiple learning payoffs* that can accrue to their school's learners in terms of both improving students' learning and dramatically enhancing the overall quality of teachers' day-to-day professional work. Importantly, these learning payoffs can include redirecting and reinvigorating teachers' own professional learning and development through designing and implementing specific *professional learning opportunities* for teachers that can address the root causes of students' learning problems. Instituting a strong "Data Team nucleus" in a school—a nucleus comprised of key change agent leaders, such as the principal and lead teachers who possess a strong commitment to active modeling of data-teaming processes to their educator colleagues—in fact, can serve as a powerful "cultural change force" (a kind of cultural change "steering committee") for growing/nurturing an authentic *data-driven collaborative inquiry culture* throughout a school learning community. Indeed, one of the key change leader insights promulgated by Nancy Love and her school learning improvement colleagues is the understanding that encouraging teachers' *direct immersion* in the data-teaming process itself is one of the best ways to nurture a "data teaming mentality" in teaching staff (i.e., an appreciation by teachers and other school staff of the multiple instructional and professional payoffs of data teaming) and, through doing so, to thereby facilitate the building of an authentic "data-driven collaborative inquiry culture" within a school learning community. Nurturing this kind of "data-driven collaborative inquiry culture" through teachers' direct immersion in mining, analyzing, and leveraging the results of multi-level "deep data digs" and related data analysis procedures is very much a central feature of the Data Teaming Collaborative Inquiry approach (Love, 2009).

The Design-Based School Improvement Logic Model and Operational Steps Process articulated by Rick Mintrop (Mintrop, 2016) was utilized in tandem with Nancy Love and colleagues' Data Teaming Collaborative Inquiry root-causal analysis methods (Love, 2009) in an integrated manner in the customized "design-based school improvement date-teaming" approach employed in the case study profiled in the next section.

School Improvement Case Study

This section profiles one design-based school improvement case study highlighting the teaching and learning improvement challenges confronting campus-based educators in their individual school setting. The particular school improvement case—that is, the school itself and the names of school leaders, along with the specific problem issues—profiled in the case description presented below is hypothetical (fictional). The case is drawn from my own extensive school improvement/organizational development consultancy experiences over the past ten years as a university-based researcher guiding and supporting the "design-based school improvement data-teaming" efforts of multiple teams of educators in elementary and secondary schools throughout the Panhandle and Permian Basin regions of west Texas in the United States. The case study presented below is intended to serve as one "case exemplar" to illustrate the power of applying *educational design research thinking* in tandem with *data-teaming processes* as concerted means to positively transform educators' professional teaching and learning practices.

Within the case description presented below, I elucidate the learning improvement *applied design research thinking* the school improvement team employed as team members leveraged design-based school improvement logic and data-teaming processes to critically analyze their school's teaching and learning data. This design research thinking enabled team members to progress from a somewhat superficial, surface-level understanding of their school's "student-learning problem" to a more comprehensive, fully data-informed and root-causal understanding of educators' own *context-specific problem of professional practice–centered* learning improvement challenges underlying the student-learning problem in their school situation. Note: The customized "design-based school improvement data-teaming" approach (i.e., applied design research thinking in conjunction with intervention design development data-teaming strategies) profiled in the hypothetical elementary school case study presented below can be readily employed by school improvement teams working in a variety of real-world school organizational contexts—in both elementary and secondary (middle/junior high and high school) settings—who are interested in identifying and addressing root-causal *context-specific problems of professional practice* potentially underlying and fueling their school's student-learning problems.

Culturally Responsive Pedagogy at Ramirez Elementary School

Initial Framing of Ramirez Elementary School's Student-Learning Problem

Julian M. Ramirez Elementary School is one of twelve elementary schools in a large urban school district situated in the Permian Basin region of west Texas in the United States.

Ramirez Elementary is a historically long-existing campus in the district that serves 450 students in grades kindergarten through sixth grade. The school has a diverse, ethnically mixed student population comprised of 58 percent Hispanic, 23 percent African American, 16 percent White/Anglo, 2 percent Asian American, and 1 percent Native American. Twenty-seven percent of the students are English Language Learners (ELL) and/or limited English proficient and 47 percent of the students qualify for free-or-reduced lunch. The teaching and instructional support staff at Ramirez Elementary consists of twenty-nine classroom teachers, along with eight part-time instructional aides, two full-time instructional coaches, and two guidance counselors. A large majority of teachers at Ramirez Elementary are White/Anglo with a long history of employment in the school district. Several of the veteran teachers at Ramirez, in fact, have been teaching at this particular school for fifteen or more years.

Principal Kayla Williams and her Ramirez Elementary teachers have been struggling to address the school's significant student learning improvement challenges. These challenges have been reflected in recent years in students' poor scores on state-mandated academic learning performance accountability tests in comparison with other elementary schools in the district. In particular, Kayla has been most concerned about the large percentage of sixth-grade students at the school—notably, large percentages of Hispanic and African-American students—who have been scoring continuously below any other student population demographic on learning performance tests (specifically, in the primary assessment areas of English Language Development, Reading Comprehension, and Writing, as well as more generally within the content areas of math, social studies, and science). Indeed, low academic performance test scores reflected in the school's Texas Academic Performance Reports (TAPR) and annual School Report Card summary data over the past four years had been cause for the Texas Education Agency to designate the school an Improvement Required (IR) campus during the most recent academic year. This designation meant that Kayla's campus was given a mandate by the state to embark on substantive school turnaround measures to demonstrate meaningful and continuous learning improvement progress on student learning performance accountability measures in the upcoming year and beyond.

To address this improvement mandate, Kayla and her Ramirez Elementary grade-level lead teachers decided to focus their attention on reviewing a variety of student performance data that they could readily access—including state student performance test scores, incremental student learning assessment data, classroom-level assignment grades, and benchmark scores. In reviewing the disaggregated data, Kayla and her lead teachers observed that the populations of failing students were comprised predominantly of Hispanic and African-American students, along with a significant percentage of English Language Learner (ELL) students. Kayla and her lead teachers decided to informally interview multiple teachers in various grade levels to obtain teachers' perceptions regarding why they felt these particular sub-populations of Ramirez students were experiencing the most pronounced learning performance difficulties. Kayla and her lead teachers quickly found that they had no trouble eliciting teachers' views on why they believed these Ramirez student sub-populations were underperforming academically. As one fifth-grade teacher, a twenty-five-year veteran educator in the district who has been at Ramirez Elementary for the past fifteen years, explained: *The school board still believes we are the school district of old. When you break down our district- and campus-level demographic data over the past twenty years you can see a shift. You see a shift in both racial and socioeconomic demographics. The central administration is full of new people who did not grow up in our community. Moreover, there are very few campus-level administrators who grew up in the school district community. The people, like myself, who grew up in this community have seen the changes and understand that you cannot expect the same things out of the students as we did in the past. In the past, the state assessments were the TAAS [Texas Assessment of Academic Skills] and the TAKS [Texas Academic Knowledge and Skills]. Those assessments do not even come close to comparing to the current STAAR [State of Texas Assessments of Academic Readiness] assessments. We need central office administrators who will stand up to the school board and lay the facts out. Once those facts are understood, we can start having true data conversations and identify students' real learning problems—and, the fact is, many of our current students' learning problems are cultural in nature.*

Another sixth-grade teacher whom Kayla and her lead teachers interviewed was even more blunt in her assessment of the student-learning problem at Ramirez Elementary: *It's a cultural thing. Many of our students, particularly Hispanic and African-American students, are living in poverty or near-poverty home environments in which both parents are working multiple jobs and are having to contend with very difficult financial situations. Many of the Hispanic parents, in fact, don't even speak fluent English. These students' parents simply do not have the time or energy—and, in many cases, the inclination—to provide learning support for their children at home.*

These parents, moreover, because of the often dire financial straits they are having to contend with, are blinded to fully comprehending the value of education and how a solid education can create new opportunities in the future for their children. On pondering these and similar responses Kayla and her lead teachers obtained through interviews with multiple Ramirez teachers, it became increasingly clear to Kayla that many of her teachers were exhibiting a form a "deficit thinking" in terms of teachers' negative perceptions of their students' academic learning abilities. A quick analysis of the collective teacher interview results highlighted for Kayla the fact that teachers at Ramirez Elementary, in general, believed that *students themselves* were the problem. Based on Ramirez teachers' own perspectives, these sub-populations of Hispanic, African-American, and ELL students were underperforming primarily because of their cultural and socioeconomic backgrounds and were hapless victims of their home/family cultural and economically disadvantaged environments.

Based on Kayla's review of Ramirez Elementary School's multiple student sub-populations' low learning performance test scores and associated teacher interview results, Kayla was able to formulate the following **initial (high-inference) Student-Learning Problem rationale** to guide her school learning improvement intervention thinking: *Large percentages of our students—in particular, our sub-populations of Hispanic, African-American, and ELL students—come to us from culturally diverse and economically disadvantaged home environments. These students, like culturally diverse and economically disadvantaged students in so many elementary schools throughout the state, do not have the home support and encouragement they need to be highly motivated to succeed academically in school. This lack of home support is further exacerbated by many of our teachers' entrenched 'deficit thinking' attitudes regarding these students' learning abilities and teachers' resulting general lack of responsiveness in providing these students with meaningful, culturally relevant learning experiences. As a result, our teachers need training on how to incorporate principles and strategies associated with culturally responsive pedagogy into their instructional planning and classroom teaching practices.* Following from this initial (high-inference) Student-Learning Problem rationale, Kayla then generated the following **intuitive If/Then statement**: *If Ramirez Elementary teachers receive targeted professional development on culturally responsive pedagogy and culturally responsive teaching practices, then teachers will be able to customize their instructional planning and classroom teaching to address the school's performance test score 'student-learning problem' associated with the school's sub-populations of culturally diverse and economically disadvantaged students.*

Following from this problem identification logic, Kayla concluded that her school's recent record of poor test scores in identified student sub-populations along with collective results from informal interviews with multiple grade-level teachers pointed to the need for Kayla to provide her teachers with a focused *professional learning intervention* that could address teachers' deficit thinking regarding these student-learning issues. Kayla decided to contact professional development consultants at the nearby Texas Education Agency regional Education Service Center (ESC) for recommendations on possible available professional support resources that could benefit Ramirez Elementary teachers. After hearing Kayla' summarization of her school's student learning challenges and her teachers' deficit thinking attitudes regarding some students' learning abilities, ESC consultants recommended to Kayla that Ramirez teachers participate in a series of Culturally Responsive Teaching (CRT) professional development (PD) sessions that are offered regularly by ESC PD specialists. ESC professional development specialists routinely customize and deliver these CRT PD sessions to instructional staff at individual campus sites as a means to expand teachers' knowledge of culturally responsive teaching practices in school districts throughout the ESC region. The Culturally Responsive Teaching PD sessions the ESC consultants described seemed a logical solution to Kayla to address her school's student sub-populations learning performance and teacher deficit thinking problems, so Kayla proceeded to schedule a series of CRT PD sessions for her Ramirez Elementary teachers.

Refined Reframing of Ramirez Elementary School's Student-Learning Problem as a *Context-Specific Problem of Professional Practice*

Teachers at Ramirez Elementary participated in and completed the culturally responsive teaching (CRT) practices PD sessions that were conducted at Ramirez Elementary during February and March. However, the implementation by regional Education Service Center consultants of the CRT practices PD sessions did not have the desired positive impact in subsequent months that Kayla had hoped for. There were a few teachers who expressed their appreciation to Kayla for the information provided in the sessions, but there was still a large number of Ramirez teachers who voiced some disgruntlement—both publicly and among themselves—at being compelled to attend professional development sessions on a topic they believed was not needed.

In the minds of many of the teachers at Ramirez Elementary, their current teaching practices were already very effective—it wasn't their teaching practices that was the problem, but rather some students' *inability to learn*. Considering the widespread negative reactions that emerged from the CRT practices PD implementation, Kayla knew that further leadership efforts were needed to address the challenging student-learning problem issues confronting her school community.

In order to expand the number of minds working on the problem, Kayla decided to create a *school instructional improvement team* at Ramirez. This instructional improvement team would be comprised of teacher volunteers from instructional staff in the school's fourth, fifth, and sixth grades (two teacher volunteers from each of these three grade-levels) in addition to the lead teacher on each grade-level instructional team, along with the school's two instructional coaches and the upper-elementary level guidance counselor. The specific task the Ramirez Elementary instructional improvement team set for themselves was to further investigate the school's student sub-populations learning performance problem through exploring in more depth what could potentially be some of the *underlying root causes*—both instructionally and organizationally—that might be contributing to and fueling their school's student-learning problem. To structure their investigative efforts, team members decided to explore three specific areas: 1) the kinds and quality of disaggregated data analyses that were being conducted by teachers; 2) the level of involvement by teachers in Professional Learning Community (PLC) activities in the fourth, fifth, and sixth grades; and 3) the overall quality and effectiveness of lessons and instructional units being planned and delivered by teachers in fourth-, fifth-, and sixth-grade classrooms.

Data Analysis and Literature Review Activities. To explore the first identified area of investigation, Kayla and her team members reviewed the disaggregated data analysis practices of teachers at the school, focusing specifically on fourth-, fifth-, and sixth-grade cumulative six-week assessment data and available Public Education Information Management System (PEIMS) and Texas Academic Performance Report (TAPR) data for the campus. Secondly, team members conducted random interviews with teacher members of fourth-, fifth-, and sixth-grade instructional teams to obtain these teachers' perceptions regarding the extent of their own and their colleagues' involvement in professional learning community (PLC)–related practices—particularly, teachers' degree of active participation in PLC-centered in-depth conversations regarding their data mining and analysis activities and how these activities were informing teachers' overall collaborative instructional planning within their grade-level instructional teams. Teachers who were interviewed consistently noted that their grade-level instructional teams did not engage in systematic disaggregated data analyses and deep data digs on a regular basis to identify individual students with learning problems nor did they routinely participate in team conversations about the results of data analyses, but used their daily "PLC-structured" planning time primarily to work separately on individual lesson planning and test grading. Additionally, when asked to describe the kinds of collaborative instructional unit planning practices teachers were engaging in within their grade-level instructional teams, the majority of teachers interviewed responded that their grade-level teams did not really focus their efforts during PLC time on collaborative instructional unit planning. According to the grade-level teachers interviewed, these teachers felt constrained in general by a lack of sufficient planning time during the school work-week, and were struggling to complete their own required individual lesson plans and grading responsibilities within the planning time afforded teachers in the current PLC time structure. Third, Kayla and team members reviewed a random sample of lesson and instructional unit plans created by fourth-, fifth-, and sixth-grade teachers during the past two six-week periods. Results of this review of a random sampling of fourth-, fifth-, and sixth-grade lesson and instructional unit plans suggested to Kayla and her instructional improvement team that teachers were not spending sufficient time together in substantive ways within their PLC-structured time to leverage insights gleaned from intensive deep data digs and collaborative analyses of student performance data to inform any meaningful, team-centered instructional planning.

As a result of these collective data analyses, Kayla and her team members were then able to identify five "key factors"—key factors unique to the *organizational and professional learning context* of their school—that they believed could plausibly be contributing to what they now viewed to be a possible ***context-specific Problem of Professional Practice*** challenge underlying and acting as the *root cause* of their earlier identified "student-learning problem" situation.

The five key factors Kayla and her team identified were: 1) teachers lack an informed understanding of the significance of cultural background on student learning performance; 2) teachers need assistance in learning how to effectively integrate culturally responsive teaching practices (i.e., culturally responsive pedagogy) into their professional teaching and learning toolsets; 3) teachers lack deep understanding on the importance of engaging in systematic, team-centered disaggregated data analyses coupled with deep data digs to inform/support the development of differentiated instruction and targeted, customized interventions as means to accurately pinpoint and address individual students' learning problems; 4) teachers lack sufficient levels of instructional capacity and academic press in their grade-level professional learning communities (PLCs) (a "PLC-lite" problem); and 5) the district has not yet invested substantively in providing needed professional development in-services and resources to assist campus-level teachers in invigorating their PLC–centered instructional teaming practices.

To ground their identification of plausible key factors in the school improvement literature, Ramirez team members then reviewed some of the available published work on professional development practices in schools. Team members found that the literature indicated that many schools routinely just introduce a professional development topic (such as helping teachers learn how to engage together effectively in PLC-centered data mining and analysis activities and data-informed instructional planning conversations) during in-services, but then fail to follow up with active implementation monitoring. As Katie Brooks and her colleagues caution: "Although some professional development initiatives are helping teachers learn about new ways of teaching, meaningful education reform requires more than just an introduction of new teaching approaches." (Brooks, Adams & Morita-Mullaney, 2010, p. 5) In addition, in reviewing the literature on English Language Learners (ELL) and student learning, task force members found that for ELL students to be successful, these students must acquire both social and academic language proficiency in English. Social language proficiency in English consists of the English needed for daily social interactions. Academic language proficiency consists of the English needed to think critically, to understand and learn new concepts, to process complex academic material, and to interact and communicate in English academic settings [Texas Education Code 74.4 (2)] (Texas Education Code, 2019). Finally, team members found evidence in the literature on student learning that students' learning *mindsets* can directly influence their academic success. As Lisa Blackwell and her research associates state: "Recent research has shown that students' mindsets have a direct influence on their grades and that teaching students to have a growth mindset raises their grades and achievement test scores significantly (Blackwell, Trzesniewski & Dweck, 2007). Indeed, both students and teachers need to be supported in developing a "growth mindset" to facilitate their positive learning.

Problem Reframing. With these literature insights in hand, team members then proceeded to move beyond their initial framing of a "student-learning problem" at Ramirez Elementary to formulate the following **refined (low inference) Problem of Professional Practice rationale**: *In order for our school to realize an increase in student achievement our school's instructional leaders (teachers, instructional coaches, instructional support personnel, along with campus administrators) have to improve their overall instructional effectiveness. Our school's instructional effectiveness is judged to a large extent by state assessment scores. Our teachers' active participation in positive improvement efforts—through directly addressing needed organizational and cultural change, and professional collaboration, formative assessment, and student feedback improvements—will enhance student-learning performance on our campus in positive, actionable ways.* Following from this Problem of Professional Practice rationale statement, Kayla and her team colleagues were then able to generate the following **refined Theory of Action (If/Then) statement**: *If Ramirez Elementary school leaders would work intentionally to enhance teachers' knowledge of instructional team capacity-building obstacles and create meaningful opportunities for professional growth in a PLC-structured environment regarding teachers' deficit thinking about Hispanic, African-American, and ELL students' learning abilities by providing 'targeted professional development' to teachers on data-teaming strategies and how to engage in effective PLC-centered collaborative conversations, then our student sub-populations' academic success would increase due to instructional teaming capacity being built within the campus's PLC structures and culturally relevant connections being made during classroom instruction.*

Employing the above problem reframing logic, the instructional improvement team proceeded to develop a **Ramirez Elementary School Change Drivers Diagram** (see Table 1) depicting the team's identified underlying (i.e., root-causal) *context-specific Problem of Professional Practice* and the data-supported change drivers that would need to be implemented to realize the school's desired Professional Learning Improvement Goal.

Table 1: Ramirez Elementary School Change Drivers Diagram

Context-Specific Problem of Professional Practice	Change Drivers	Professional Learning Improvement Goal
Ramirez teachers' overall instructional teaming capacities in the areas of data-informed professional collaboration and student assessment and feedback are in need of further development.	School Community–Wide Organizational and Cultural Change	Through the design and delivery of a pilot PD program to Ramirez Elementary fourth-, fifth-, and sixth-grade teachers, teachers will acquire specific knowledge and tools on how to strengthen their grade-level, PLC data analysis and instructional planning practices to design targeted learning support interventions and provide meaningful feedback to address students' individual learning improvement needs across the elementary-level content learning assessment areas.
	Professional Learning Communities — Climate and Culture Development	
	Teacher skill enhancement in designing and implementing meaningful, culturally responsive teaching (CRT)–sensitive Student Formative Assessments	
	Teacher coaching on Student Feedback Practices in conjunction with intentional development of teachers' culturally responsive teaching (CRT)–sensitive Disaggregated Data Analysis and Targeted Student Learning Improvement Intervention Design Skills	

Intervention Design Development

The Ramirez Elementary School Change Drivers Diagram identified four specific *change drivers* to guide Ramirez educators' collaborative teaching and learning intervention design efforts. Importantly, these change drivers: 1) articulated in clear terms the underlying, root-causal *context-specific Problem of Professional Practice* fueling Ramirez educators' surface-level student-learning problem; and 2) provided the data-informed intervention logic that could enable Kayla and her team members to work together intentionally to formulate practical action strategies to achieve their desired instructional improvement goal of strengthening Ramirez teachers' overall instructional teaming practices as a means to improve student learning. The **first change driver** the task force identified was *organizational and cultural change*. Building a positive school culture that fosters *authentic teacher collaboration and instructional capacity* is not achievable without transformational leadership. When this is often discussed, culture and community are often used synonymously. However, the concepts of culture and community do not mean the same thing. As Mary Hooper and Victoria Bernhardt emphasize: "Transformational leaders committed to creating capacity for learning and equity must attend to both the local community and the professional culture of the school in a manner that moves everyone toward functioning as an inclusive learning community." (Hooper & Bernhardt, 2016, p. 99) Moreover, this kind of authentic capacity for learning can only be realized when a certain *level of trust* is generated between/among educators, students, and family and community stakeholders. When this level of trust is acquired, educators are more likely to design and implement worthwhile learning improvement initiatives and work to refine their own professional practices.

The team's **second change driver** highlighted the importance of all Ramirez instructional leaders (lead teachers, instructional coaches, school counselors, and campus administrators) working together intentionally to *enhance teachers' active participation and involvement in the Professional Learning Community (PLC) structures in place on their campus*. Professional learning communities were instituted fours years ago at Ramirez Elementary School (in conjunction with the implementation of the PLC model across all elementary campuses within the school district) as a means for campus-based teachers to be able to collaborate together within a "structured time frame" to increase student achievement. The express purpose of the PLC implementation initiative was to create a "culture of teams" wherein teachers could improve their pedagogical skills and engage together in team-centered data mining and analyses and professional conversations about their data. However, the PLC model is not self-propelling.

The realization of dynamic and effective professional learning communities on individual campuses requires the concerted efforts of campus-based instructional leaders encouraging and modeling for teachers *how to engage effectively* in ongoing conversations about the purposes and payoffs of actively participating in PLC-centered data analysis and instructional planning activities focused on accurately identifying individual students' learning needs and improving all students' classroom-based learning performance. In conjunction with this second driver, the **third change driver** the team identified was the critical importance to student learning success of *teachers' active involvement in designing and implementing meaningful, culturally responsive teaching–sensitive student formative assessments*. Formative assessments have been proven to increase student achievement in numerous studies. For example, James Popham has stated that formative assessment is a process that is planned: "Formative assessment is a planned process in which assessment-elicited evidence of students' status is used by teachers to adjust their ongoing instructional procedures or by students to adjust their current learning tactics." (Popham, 2010, p. 138) Therefore, when teachers plan formative assessments effectively, student achievement should increase. Students and teachers can both grow in positive ways from proper formative assessment planning. Finally, the **fourth change driver** that team members identified was the importance of *teacher feedback to students*. During the previous school year, campus leadership had introduced a focus on "teacher feedback to students" as a campus-wide initiative. However, this initiative was not supported by the provision of continuous professional learning support and follow-up to teachers (both within PLC instructional planning meetings and during teacher peer observation/coaching sessions on teachers' classroom-based interactions with students) on exactly *how* to go about crafting and providing useful feedback to students on their learning performance, so the initiative faltered. Teachers need to be provided with targeted professional learning activities and follow-up resources to enable them to fully internalize the importance of providing relevant, culturally responsive teaching–sensitive feedback to students, along with practical strategies that teachers can readily employ on how to *effectively leverage their student formative assessment data-analysis activities to craft meaningful feedback to students*.

Using their Change Drivers Diagram as a "practical roadmap" for implementing the needed professional learning improvement strategies, Kayla and team colleagues were then able to generate a focused **Instructional Improvement Intervention Design** (consisting of carefully planned, iterative sets of trainings/PD on practical improvement strategies and complementary activities) to guide their overall professional learning improvement efforts (see Table 2).

Table 2: Ramirez Elementary School Instructional Improvement Intervention Design

Week 1	PLC and Classroom observations	Principal will observe and participate in grade-level, PLC-centered team meetings and observe classrooms and take notes
Week 2	PLC Reflective Lens Activity	Present and have the teachers do PLC Reflective Lens Activity
Week 3	Formative Assessment Training and related professional learning activities	Seek out focused PD sessions from Education Service Center on Formative Assessments
Week 4	Student Feedback Training and related professional learning activities	Seek out focused PD from Education Service Center on Student Feedback
Week 5	Lens Reflection in PLC instructional team meetings	Reflect on the PLC Reflective Lens activity and brainstorm and listen as a group to improvement ideas
Week 6	Deficit Thinking Training and related professional learning activities	Seek out PD on Deficit Thinking
Week 7	Observation/Coaching with grade-level instructional team leaders	Observation and coaching by instructional team leaders with extensive note-taking for quality reflection
Week 8	Observations by principal	Observations by principal with extensive note-taking for quality reflection
Week 9	Collaborative Inquiry	Sharing feedback from principal, peers, and team leaders

Educational Design Research Results and Findings

The collective design-based school improvement "problem reframing and intervention design development" *thinking* and data analysis *processes* engaged in by Ramirez Elementary instructional improvement team members and grade-level teachers over the course of their school learning improvement intervention design and implementation efforts produced some discernible **Educational Design Research Results and Findings**. Kayla and her instructional improvement team's refined reframing of their Ramirez Elementary School's initially identified student-learning problem into a *context-specific Problem of Professional Practice* led them to the informed understanding that the original strategy of helping teachers learn about and integrate culturally responsive teaching (CRT) knowledge and skills into their instructional practices was only a superficial strategy. This was certainly a useful and needed strategy, but a strategy that only addressed "surface-level symptoms" of the much deeper professional learning improvement challenges confronting Ramirez educators. The CRT training addressed teachers' cultural biases and negative perceptions that multiple sub-populations of Ramirez students simply did not have the perseverance and innate capacity to learn, but did not address the real underlying, root-causal *problem of professional practice* learning improvement challenge the teachers themselves faced.

Specifically, the implementation of the intervention design generated some clearly observable **design research results**. First, the team discovered that the *underlying root cause* of their school's initially identified student-learning problem involved Ramirez Elementary teachers themselves needing to learn how to go about addressing—as education professionals in intentional, data-informed, and comprehensive ways—each student's *individual, multi-faceted learning improvement needs* (which cannot simply be explained as being "cultural in nature"). Second, Ramirez Elementary task force members learned that effectively addressing Ramirez students' learning problems could only be realized through teachers themselves (working within their various grade-level instructional teams at the school) learning how to *engage meaningfully in data-informed collaborative inquiry*. This kind of meaningful collaborative inquiry required that teachers learn how to actively incorporate data-intensive, root-causal analysis techniques and PLC-driven collaborative conversations about student data into their overall instructional planning and targeted intervention design development activities to positively impact student learning.

Finally, Kayla and her Ramirez instructional improvement team—working together within the design-based school improvement model and data teaming collaborative inquiry process to investigate the root causes of their students' learning problems—were able to generate one overarching **design research *finding*** from their collective intervention design development and implementation efforts. This finding can be summarized as follows: As a result of the intervention design implementation (involving professional development and observation/coaching follow-up on PLC reflective lens activities, formative assessment and feedback, and data analysis–informed PLC conversations), Ramirez teachers over time were becoming noticeably more confident and enthusiastic about wanting to engage in developing their own kinds of "customized" professional development sessions to support teachers' continuing professional learning in these areas. Indeed, as a result of teachers' intensive instructional improvement team efforts within the intervention design period in analyzing multiple student performance data and engaging in data-informed analyses of students' individual learning problems, over time teachers' *own sense of their overall instructional teaming capacity* began to noticeably increase as teachers collectively began feeling more confident and secure in their own abilities to engage together effectively in sustained team-centered professional learning.

Discussion

This section presents a literature-informed discussion of salient aspects of the design-based school improvement case study and associated educational design research results and findings highlighted in the above section. The discussion below is organized within three relevant areas of transformative school improvement practice, namely: 1) the instructional capacity–building power of data teaming; 2) reenergizing professional learning communities; and 3) adopting a design-based school improvement data-teaming approach to transforming educators' professional practice. A number of *practical leadership strategies* emerging from literature-supported insights gleaned within these three transformative school improvement practice areas are then presented.

The Instructional Capacity–Building Power of Data Teaming

The collective data analysis and professional learning development efforts of the educators involved in the design-based school improvement case profiled in this article underscore the power of "data teaming"—i.e., data-driven collaborative inquiry—for building and nurturing educators' *team-centered instructional capacities*. The data-teaming approach is fundamentally about educators working together in academic teams to leverage systematic data analysis techniques as a means to explore the underlying root causes of students' learning problems and, in so doing, to elucidate important professional learning improvement need areas that require intervention within educators' own professional practice.

The Ramirez Elementary School case highlights the positive dividends that multiple learners can reap through campus-based educators redirecting and focusing their attention and energies squarely on their own "instructional capacity–building" for teaching and learning improvement. As part of their data-teaming efforts, Kayla (the campus principal) and her Ramirez Elementary instructional improvement team members analyzed multiple kinds of student performance assessment data in conjunction with perceptual data obtained through teacher interviews as means to zoom in on possible underlying root causes of their elementary students' learning problems—including, in particular, student-learning problems associated with large percentages of the school's Hispanic, African American, and English language learners (ELL) student sub-populations. Armed with the collective results of these data analysis activities, Kayla and her team were then able to identify four "key factors" (highlighted in the above Ramirez Elementary case study) informing the *root-causal* professional practice improvement challenges underlying their school's identified *surface-level* student-learning problem. These key factors, in turn, led Kayla and her team to the realization that they needed to redirect their school improvement efforts from a focus on students' learning deficiencies to working intentionally to transform teachers' own professional practices. Kayla and her team accomplished this "school improvement refocusing" through developing and providing their teachers with a *professional development (PD) program intervention design* (involving PLC cultural change, along with the provision of PD support on student formative assessment and feedback techniques and meaningful instructional coaching) focused specifically on: 1) enhancing teachers' knowledge and skills related to bolstering teachers' own instructional team capacity-building practices; and 2) and creating meaningful opportunities for professional growth within teachers' PLC environments to address teachers' deficit thinking about Hispanic, African-American, and ELL students' learning abilities through professional training on specific instructional strategies and student support protocols. Interestingly, there were two critical keys to the Ramirez Elementary educators' "data teaming" success. These two keys involved: first, providing teachers with *targeted professional development* in the use of the "data teaming" (i.e., data-driven collaborative inquiry) approach; and then, second, providing teachers and other campus instructional leaders with sustained *professional learning support* as teachers worked to incorporate these new skills into their overall instructional planning and classroom teaching professional practices. Ultimately, the Ramirez Elementary instructional improvement team's most illuminating "data-teaming insight" was their new understanding that their school improvement efforts in addressing their student sub-populations' learning challenges could only be positively advanced through Kayla and her team redirecting and focusing their efforts intentionally on working to bolster and enhance *teachers' own culturally-responsive instructional capacity levels* through providing teachers with meaningful (i.e., data-informed), team-centered professional learning opportunities.

David Coghlan and Teresa Brannick (2014), in their discussion of methodological considerations associated with designing and conducting action research in one's own organization (i.e., improvement-centered "insider action research" aimed at addressing identified problem or need areas within one's own organization), highlight some of the "disadvantages" that can sometimes beset insider action researchers from actually being "*too close* to the organization's data" (Coghlan & Brannick, 2014, p. 134). Coghlan and Brannick make this point by highlighting the inevitable "closeness to one's own organizational data" that is a by-product of working "in" an organization and, thus, the resulting importance for insider action researchers of working to maintain a proactive *epistemic reflexive stance* toward one's own lived experiences as a member of the organization. As Coghlan and Brannick (2014) explain, *epistemic reflexivity* refers to the process of continuously analyzing your own lived experience, and being open to questioning the comprehensiveness and objective insightfulness of your own understandings *in comparison with other organization members' understandings* of the organization's data. Thus, epistemic reflexivity essentially means being attentive to and inquiring into the process of knowing *within and across multiple organization members* as this knowing unfolds in an organizational context.

At the most practical level, this suggests that each individual of an organization, when scrutinizing and analyzing their organization's data, develops her/his own perspectivist views regarding the meaning of that data. As a consequence, this then means that *all* organization members need to remain open to listening to and consciously considering the multiple (often contrasting) perspectives of *other* organization members who are reacting from *their* own individual "perspectivist points of view" to the very same organizational data.

This active process of "epistemic reflexivity" resonates especially well with Margaret Wheatley's insights on the challenges and opportunities associated with leading effective positive change and improvement in human organizations. In her seminal book entitled *Leadership and the New Science: Discovering Order in a Chaotic World*, Wheatley (1999) highlights multiple insights that emerge from the application of key concepts associated with twentieth-century "new science" fields such as biology and quantum physics to the practice of effective leadership in human organizations. Through her review of new science concepts from the world of quantum physics, Wheatley provides change agent leaders with some intriguing insights on the change-inducing power of nurturing *active participation by multiple members* in human organizations. In Wheatley's view, people working in organizations can really only construct a truly insightful, organization-advancing understanding of "who we are and where we are going as an organization" by inviting as many members of the organization as possible (from across multiple levels of the organization) to engage dynamically and directly in scrutinizing and analyzing the organization's data. After openly sharing and discussing their own individual interpretations of the organization's data with each other, organization members can then proceed to work together to construct a composite, data analysis–informed, *rich multi-perspectivist understanding* of their organization's current condition as a means to consider realistically the organization's prospects for moving forward purposefully into the future. As Wheatley states: "Participation, seriously done, is a way out from the uncertainties and ghostly qualities of this nonobjective [quantum physical] world we live in. We need a constantly expanding array of data, views, and interpretations if we are to make wise sense of the world. *We need to include more and more eyes* [emphasis added]. We need to be constantly asking: "Who else should be here? Who else should be looking at this?" …An organization rich with many interpretations [of the organization's data] develops a wiser sense of what is going on and what needs to be done. Such organizations become more intelligent. It would seem that the more participants we engage in this participative universe, the more we can access its potentials and the wiser we can become. We banish the ghosts of this ghostly universe by engaging in a different pattern of behavior—one in which more and more of us are included in the process of observing what is going on, and *contributing our unique interpretations to the organization* [emphasis added]." (Wheatley, 1999, pp. 66-67)

School improvement team members in the Ramirez Elementary case leveraged the *instructional capacity–building power of data teaming*—involving active participation by multiple organization members in the careful analysis and interpretation of relevant data—as a means to expand and deepen their initial conception of their school's context-specific student-learning problem challenges to include a more insightful (i.e., relevant data–informed) understanding of educators' own *professional practice learning enhancement needs* on their campus. The Ramirez Elementary instructional improvement team accomplished this through employing root-causal data analysis techniques (Love, 2009) as an integral part of their overall application of the *Design-Based School Improvement Logic Model and Operational Steps Process* (Mintrop, 2016). Importantly, teachers, instructional coaches, and the principal working together in the Ramirez Elementary case situation discovered, through engaging together in the "design-based school improvement data-teaming" process, the potential of data-informed collaborative inquiry—and, in particular, the transformative power of *immersive, team-centered professional learning*—as a positive catalyst for refocusing and reinvigorating their school's teaching, leading, and learning improvement culture. As a result of the Ramirez team's implementation of their data analysis–informed "instructional improvement intervention design" at their campus site, school improvement team members were able to reap instructional improvement benefits for their campus teachers that resulted in positive enhancements to educators' professional practice. In her recent writing discussing key attributes and practices associated with instructional capacity–building in schools, Patricia Stringer (2013) highlights four "central tenets" that school leaders should be mindful of in developing a coherent vision of instructional and organizational capacity–building for school improvement.

These four tenets include: 1) focusing on student-centered learning; 2) developing an improvement mindset; 3) nurturing empowerment through shared leadership; and 4) building a collaborative community. (Stringer, 2013, pp. 24-27) As Stringer emphasizes, these four tenets require that stakeholders work together in intentional ways to ensure that all school organization members are freely able to: 1) express their own voice; 2) participate in collaborative decision making; 3) engage in shared dialogue desirous of learning; and 4) accept others' viewpoints. (Stringer, 2013, p. 27) Moreover, Stringer underscores the importance of providing educators with professional development (PD) intervention programs that are focused directly on *enhancing teachers' instructional practices* as a critical "link" in building educators' overall instructional capacities for realizing meaningful school improvement. According to Stringer, when designed and delivered optimally, this kind of focused professional development: 1) maintains a 'working towards vision' attitude among educators; 2) is layered appropriately to address multiple school and stakeholder needs; 3) exemplifies balanced attention to developing individual, collective, and/or systemic capacities; 4) incorporates buy-in practices of collaborative interchange, reflective practice, and openness to new ideas; 5) utilizes professional development management that involves flexibility, relevance, and scaffolded learning; 6) includes parents in the education milieu; and 7) builds a community of learners focused on student-centered learning, empowerment, improvement, and community. These seven characteristics of "focused professional development" collectively reflect, in Stringer's view, the specific kind of professional development intervention program that is required to "sustain the impetus for change" among education stakeholders following the initiation and implementation of any new learning improvement innovations. (Stringer, 2013, pp. 67-69)

These four central tenets of instructional and organizational capacity–building in schools in conjunction with the seven characteristics of focused professional development articulated by Stringer (2013) could be clearly discerned in the team-learning behaviors of instructional improvement team members in the Ramirez Elementary case study, as team members engaged in their design-based school improvement data-teaming activities. Indeed, Ramirez Elementary team members' collective design-based school improvement efforts produced the following substantive improvements in Ramirez educators' overall professional practice (as reflected in the case study's educational design research results and findings): 1) the data analysis and instructional planning activities educators engaged in opened their eyes to the potential of data teaming for contributing to students' learning success; 2) educators' PLC conversations deepened and became more meaningful; and 3) educators developed new, more positive perspectives regarding the usefulness of data teaming and team-centered instructional planning as *integral components* of their own and their grade-level team's instructional practice.

Reenergizing Professional Learning Communities

In many schools and school districts in which professional learning community (PLC) organizational structures exist, educators on individual campuses and administrators at both the campus and district levels have not fully comprehended the significant *teaching, leading, and learning higher-level payoffs* of "data-driven instructional teaming" that can accrue to educators through engaging collaboratively within PLCs. This may, in part, be due to the fact that teachers and administrators do not fully understand the underlying premise behind the "professional learning community" concept. Rather than understanding PLC structures in place on their campuses as opportunities for intentional, ongoing data-informed professional learning and growth, teachers routinely see PLC time as opportunities to engage in individual lesson planning and grading (which is antithetical to the idea of *team-centered* instructional planning and professional learning). Moreover, within their PLC-structured time, some teachers on individual campuses may even engage in subversive strategies on how to "divide and conquer" their academic teaming or PLC instructional workload to complete and/or even ignore this work through taking a kind of "smoke-and-mirrors compliance" approach to PLC teaming. This is symptomatic of what many school improvement researchers, including Rick Dufour and Douglas Reeves (2016), call "PLC-lite". As a consequence, teachers are not using "PLC teaming time" in productive ways to actually look carefully at student data to authentically "change the ways they teach" and are not growing professionally through focused instructional teaming. In these situations, teachers' negative attitudes and behaviors in reaction to PLC structures are preventing teachers from becoming immersed in and seeing the positive value of an authentic PLC culture for helping teachers *change and improve* their professional teaching practices. Because of the kinds of negative "PLC-lite" attitudes and discourse behaviors that can be prevalent in schools and school districts, many teachers are not motivated to engage in proactive, collaborative within- and cross-grade level authentic data-teaming practices to mine teaching and learning data to systematically analyze the root causes of students' learning problems.

This lack of involvement in root-causal data analysis causes teachers to fall short in being able to develop and implement targeted teaching and learning interventions that can enhance learning effectiveness for all students. Thus, this "PLC valuing challenge"—that is, nurturing a positive and authentic "PLC valuing culture" in individual campuses and throughout school districts—becomes a real school improvement leadership challenge for many school and district leaders. As a result, this challenge of convincing educators of the "higher-level payoffs" of engaging in meaningful, data-driven PLC practices is an important concept for any change agent leader who is interested in promoting the development of an authentic "PLC data culture" on individual campuses and throughout a school district. It is only through engaging in organization-wide, systemic cultural change that school leaders will be able to nurture on their individual campuses the kind of positive, supportive professional learning environment within which *authentic* "data-driven PLC practices" (as opposed to "PLC-lite") will have a chance to flourish.

As the Ramirez Elementary School educators experienced in their own campus improvement situation, many schools and school districts throughout the United States are finding themselves stuck in this "half-baked PLC implementation" rut. That is, they are finding themselves having to confront a long-term "authentic PLC implementation and sustainability" dilemma challenge, because they haven't taken the time to carefully think through and provide the breakthrough leadership motivational support that is needed to dynamically change and nurture the kinds of teaching, leading, and learning cultures on their campuses and throughout their districts that are required to positively support authentic PLC data-teaming practices. The specific change leadership challenge, then, for school leaders such as Kayla and her Ramirez Elementary campus-level colleagues is: How to systematically change the data-driven instructional planning and classroom practices culture within their school community—along with working to intensify district-wide principal conversations with central office administrators during regular principal meetings about the need to "value" PLC data culture–building as a district-wide priority for teaching/learning improvement throughout the district community—such that teachers and administrators on their own campuses as well as district-level personnel begin to fully understand the *higher-level payoffs* of authentic "data-driven instructional teaming" for enhancing the teaching and learning effectiveness of themselves and their students.

One noteworthy and intriguing "organizational learning and development" insight that emerges from the Ramirez Elementary case (an insight that typically surfaces as well from other similar school learning improvement cases) is that school leaders' efforts in nurturing the data-teaming process at the individual campus level—if done correctly and with sustained enthusiasm and commitment over time—can often result in the evolution of this "data-teaming process" into a *natural incubator* for jumpstarting and spurring on teachers' own enthusiasm for engaging together in continuous, team-centered professional learning. This "professional learning incubator" effect occurs through the ways in which sustained immersion over time in data teaming can help teachers develop an enhanced "professional learning and growth *mindset*"—a professional learning/growth mindset that then becomes self-reinforcing and self-sustaining. In short, teachers learn how to become their own best staff developers. After teachers and other instructional leaders at the individual campus level—such as in the Ramirez Elementary case situation—become sufficiently immersed in the data-driven collaborative inquiry process and begin to experience first-hand the instructional payoffs of this data-teaming immersion process (teachers actually "experiencing" first-hand the positive instructional payoffs of data teaming for both students and themselves is very important), then teachers and other school leaders begin to become very adept at planning for, developing, and engaging in their own unique brand of "context-specific, customized professional development". In other words, campus-based school leaders (teachers, principals, and related instructional staff) begin to consciously develop their own dynamic, group-motivated "sustained team learning/professional growth" actionable mindset. This new team learning and professional growth mindset, in turn, then becomes the catalyst for jumpstarting and invigorating educators' team-centered professional learning community (PLC) activities.

Perhaps one of the most illuminating insights emerging from reflecting on the challenges and professional learning payoffs experienced by the Ramirez Elementary school improvement team that can accrue to groups of campus-level educators through expanding and deepening educators' immersion in team-centered PLC activities is that authentic improvements in learning (both students' and teachers' learning) *cannot occur without substantive changes in teachers' own professional learning and classroom instructional practices*.

Realizing authentic learning improvements in the performance levels of the student sub-populations at Ramirez Elementary only became possible when teachers and administrators at the school—working together as a school learning improvement team—began focusing intentionally on expanding and deepening their own professional learning activities. Of course, these "changes in professional practice" necessarily also included Ramirez educators' ongoing efforts in working consciously to refine their own culturally responsive teaching (CRT) practices as a substantive component of their overall professional learning improvement efforts. Learning about CRT best practices and integrating these practices into their overall instructional regimen was certainly an important start for Ramirez Elementary teachers. However, the underlying root causes of the Ramirez Elementary student-learning problem—namely: 1) teachers' lack of PLC-centered instructional capacity and academic press (a "PLC-lite" situation); and 2) teachers' lack of involvement in meaningful disaggregated data analysis processes— required that Ramirez teachers and the school principal also work to address their PLC-lite challenges while simultaneously also learning how to engage in systematic disaggregated data analyses coupled with deep data digs to inform and support the development of differentiated instruction and targeted, customized interventions to meet the specific learning needs of individual students.

Collectively, these insights emerging from the Ramirez Elementary case provide some substantive support for the practical validity of the "design-based school improvement data-teaming" process as an effective strategic approach that educators, working within their existing PLC organizational structures, can use to leverage teaching and learning data in effective ways to accurately identify and address students' learning challenges and, in so doing, to transform their own professional teaching and learning practices. Ramirez Elementary educators' successful *professional practice transformation*—resulting from their own immersion in the design-based school improvement data-teaming process—also provides positive support for the PLC culture–building power of the data-teaming process as a means to jumpstart meaningful professional teaching and learning improvement within individual campus settings.

Adopting a Design-Based School Improvement Data-Teaming Approach to Transforming Educators' Professional Practice

The student-learning problem the team of educators confronted in the case study profiled in this article is certainly typical of the kinds of learning improvement and school accountability challenges that change agent leaders working in elementary and secondary schools across the United States routinely confront. The educators involved in instructional improvement teaming activities in the Ramirez Elementary School case situation were able to leverage their application of the design-based school improvement process (Mintrop, 2016) in conjunction with immersive data-teaming practices (Love, 2009) to develop new knowledge and skills that transformed their data-driven school improvement leadership practices in significant ways. In reflecting on the desirability of using data to inform instructional improvement, Amanda Datnow and Vicki Park (2014) point out insightfully that educators interested in realizing demonstrable student learning improvement gains in connection with their instructional improvement efforts on their campuses must keep in mind that in order to achieve positive improvement results educators cannot separate or disconnect the different kinds of data (student learning performance data as well as other kinds of teacher data) they analyze from *conscious self-reflection* about their own pedagogical assumptions, beliefs, and instructional practices. As Datnow and Park emphasize: "Thoughtful data-informed decision making—and, more specifically, data-informed leadership—involves more than collecting and looking at student achievement data. A deep process of inquiry using multiple sources and types of data is essential in developing instructional plans that will improve student achievement. Different student performance data lend themselves to informing different types of concerns and decision-making processes. Educators must look beyond their taken-for-granted assumptions to critically present and assess alternative explanations and gather more data before leaping to solutions or answers. Most important, they must think deeply about their practices, especially around issues of access, class placement, and pedagogy. *The thoughtful use of data for instructional decision making cannot be divorced from reflection about one's beliefs, assumptions, and practices around how students learn* [emphasis added]." (Datnow & Park, 2014, p. 97)

In discussing the importance of conducting a systematic needs assessment as an intentional strategy that educators should employ to identify root-causal problems of professional practice in student learning–improvement need situations, Rick Mintrop (2016) provides an illuminating insight involving a nuanced conceptualization of exactly what a "problem of practice" actually is, including the fundamental influence educators' own beliefs and practices have on their ability to effectively address student-learning problems.

As Mintrop states: "The achievement gap is a huge problem in the United States and elsewhere. But [educators] will have to realize that *the gap is not a problem of practice, but the result of many practices* [emphasis added], and this result is indicated by a measurable achievement gap. Indicators point to problems, but are not the problem of *practice*. No designed intervention can close the achievement gap directly; educators can only change beliefs, attitudes, or practices that may eventually be registered on the indicator. School and district leaders have the strongest influence on adults, not students. So leaders' problem[s] of practice should focus on beliefs, attitudes, or practices of adults who are members of, or associated with, their organization." (Mintrop, 2016, p. 66) This important insight by Mintrop directly underscores the central importance of change agent leaders working collaboratively with educator teams in schools to positively change *educators' mindsets*—i.e., their assumptions, attitudes, and beliefs—associated with educators' own views of their classroom-based pedagogical responsibilities and their overall instructional practices. Indeed, this insight regarding the central importance of educators examining their own assumptions, attitudes, and beliefs about pedagogy and their own professional instructional practices in properly identifying "problems of practice" in school learning improvement situations undergirds and anchors in fundamental ways the practical usefulness of the *Design-Based School Improvement Logic Model and Operational Steps Process* (Mintrop, 2016). Intriguingly, the importance of changing educators' own professional assumptions and beliefs was powerfully illustrated in the Ramirez case study as Kayla (the principal) and her instructional improvement team colleagues had to revisit their shortsighted thinking reflected in their initial plan to provide "culturally responsive teaching (CRT) practices" professional development for teachers at their school as a definitive student-learning problem solution *in and of itself*—that is, their initial change agent mindset that instituting CRT practices would somehow miraculously yield substantive learning improvement results for their school's students. After experiencing a wake-up call on this shortsighted thinking through further analysis of relevant data, the team discovered that implementing CRT practices was *only part* of a realistic solution to their students' learning challenges. Indeed, the "real learning challenge" the Ramirez team needed to confront centered directly on the challenge of how they, as an improvement team, needed to change *their own and their teacher colleagues' instructional mindsets*—in short, how they as a team of educators needed to address their own professional learning.

Indeed, Ramirez Elementary instructional leaders' further reflections on their school's own context-specific learning improvement challenges and the new data-informed understandings about educators' own professional learning practices uncovered by the Ramirez instructional improvement team provide some positive evidence for the practical benefits that can accrue to campus-based educators of leveraging the power of design-based school improvement thinking and data-teaming processes to realize meaningful school improvement. Most importantly, the use by teams of educators working in their own school contexts of design-based school improvement thinking in conjunction with systematic data-analysis processes can operate together as concerted means to enable educators to systematically investigate and identify significant *professional practice challenges* underlying their school's student-learning problems. In fact, the overall "design-based school improvement data-teaming" approach implemented by the instructional improvement team of educators working in the Ramirez Elementary School case profiled in this article suggests that educators' own intentional collaborative data-teaming—when coupled with an openness and willingness to examine and change their professional mindsets regarding their own pedagogical beliefs and instructional practices—can result in a new sense of positive professional learning and organizational renewal for school learning stakeholders. Invoking a composite Greek term to capture this sense of "organizational renewal" that people can experience as change agents in human organizations, Margaret Wheatley describes a particular sense of organizational *autopoiesis* (i.e., organizational 'self-renewal')—an intentional feeling experienced by organization members of a desire for team revitalization and positive organizational renewal—that can operate as a powerful force that change leaders and their colleagues can tap into to engender positive change and improvement in leading and learning organizations. As Wheatley states: "There is an important paradox in living systems: Each organism maintains a clear sense of its individual identity *within* a larger network of relationships that helps shape its identity. Each being is noticeable as a separate entity, yet it is simultaneously part of a whole system. While we humans observe and count separate selves, and pay a great deal of attention to the differences that seem to divide us, in fact we survive only as we learn how to participate in a web of relationships. Autopoiesis describes a very different universe, one in which all organisms are capable of creating a 'self' through their intimate engagement with all others in their system. This is not a fragile, fragmented world that needs us to hold it together. This is a world *rich in processes that support growth and coherence through paradoxes that we need to contemplate* [emphasis added]." (Wheatley, 1999, p. 20)

School improvement team members at Ramirez Elementary School appear to have internalized in important ways—through these educators' collective, data-informed instructional improvement activities and team-engendered new reflective understandings—this powerful feeling of *organizational self-renewal* as they refocused their "problem of practice" learning improvement efforts from an emphasis solely on implementing quick-fix solutions to perceived student-learning problems to a broader and deeper data-informed realization of the need to learn *how to work together in new ways* to transform their own pedagogical beliefs and professional instructional practices. The new learning improvement insights and intervention design strategies generated by the educators involved in the Ramirez Elementary School case study examined here suggest that education leaders working in a variety of elementary and secondary school contexts may also find the application of the "design-based school improvement data-teaming" approach of practical use as they work with colleagues to accurately identify and address potential underlying, context-specific problems of professional practice fueling persistent student-learning problems in their own school organizational settings.

Practical Leadership Strategies to Support Educators' Design-Based School Improvement Data-Teaming Practices

Insights emerging from the above literature-informed discussion of the hypothetical design-based school improvement case study profiled in this article suggest a number of *practical leadership strategies* that school leaders, working in real-world school settings, can employ to actively support educators' design-based school improvement data-teaming practices. These leadership strategies may be of use to school leaders (campus-based principals and assistant principals, professional learning community and grade-level academic team leaders, content area department heads, instructional coaches, master teachers, etc.), currently working in a variety of elementary and secondary school contexts, who are interested in exploring the potential of leveraging design research methods in tandem with actionable data-teaming processes as concerted means to help transform and invigorate educators' "design-based school improvement data-teaming" professional teaching and learning practices. These leadership strategies are briefly presented below.

School leaders can enhance their ongoing efforts to foster positive teaching and learning improvements on their elementary and secondary campuses by implementing the following practical leadership strategies:

Assume a leadership role on your campus as an active promoter and modeler of data-teaming practices. School principals and their instructional leadership colleagues, as the primary instructional leaders on their campuses, can play a substantive role in actively promoting the multiple, positive dividends of data-teaming practices to their teaching staff. School principals and other campus-based instructional leaders can most directly motivate and influence teachers to participate in data teaming by working to nurture and build a *culture of collaborative data-driven inquiry* on their campuses—a school-wide culture in which teacher-led collaborative inquiry oriented around data is encouraged and valued among all instructional personnel. From an organizational development perspective, school principals and other campus-based instructional leaders can even use their teachers' initial grade-level data-teaming efforts—perhaps on campuses where educators are just in the beginning stages of building a positive data-teaming culture or in school contexts where educators may have become somewhat "stalled" in their professional learning community (PLC) and data-teaming efforts—as incremental opportunities to build greater enthusiasm among larger number of teachers for the data-teaming process. Principals and other school instructional leaders can accomplish this by: 1) engaging in ongoing conversations with teachers about the multiple *teaching and learning payoffs* data teaming can engender in terms of improving students' learning performance and enhancing teachers' own professional learning and growth; and 2) participating themselves in campus- and grade-level data-teaming activities alongside teachers and, through doing so, becoming *proactive modelers* of how to work together purposefully within data mining and analysis efforts to generate new understandings on how to move forward with data-informed instructional planning that can effectively meet students' individual learning needs. Moreover, legitimating and encouraging a strong "data-teaming nucleus" in a school (perhaps in the form of supporting one or two grade-level teams of core teachers on a campus who have already bought into and are enthusiastic about engaging in data-teaming processes) can serve as a powerful "cultural change force" for growing/nurturing collaborative inquiry practices among the larger teaching staff and solidifying data teaming as a core operational component of a school's overall teaching, leading, and learning improvement culture.

Leverage core tenets of design-based school improvement thinking in conjunction with practical data-teaming processes to transform educators' professional practice. School leaders can promote positive teaching and learning improvements on their campuses and nurture a culture a continuous professional learning and growth for their instructional staff by leveraging the analytic power of *design-based school improvement thinking* in tandem with the application of practical *data-teaming processes* to jumpstart teachers' team-centered student data mining and analysis efforts and invigorate teachers' overall instructional planning, classroom-based lesson and unit delivery, and learning assessment activities. The application of design-based school improvement thinking in conjunction with data-teaming processes modeled in the case study profiled in this article, can be especially useful to educators interested in probing the "root causes" of their school's student-learning problems in order to bring to light and address potential underlying *context-specific problem of professional practice* challenges that can often fuel students' surface-level learning problems.

Tap into experienced teachers to serve as "data-teaming mentors" to others. Savvy school improvement leaders can tap into the innate confidence and enthusiasm of teachers who are experienced and fully informed on the positive benefits of professional learning community (PLC)-centered data teaming to mentor other teachers on the *positive instructional payoffs* to both students and teachers of immersion in ongoing data-teaming activities. Additionally, whenever feasible, these experienced teachers can engage in "proactive modeling" of data-teaming instructional planning and implementation best practices to other education personnel through offering to teach "demonstration lessons" in other teachers' classrooms and through providing ongoing assistance to teachers who may still be working to fully incorporate data-teaming instructional planning, lesson delivery, and assessment techniques into their own classroom-based professional practices. Importantly, these teacher leaders can also be instrumental in helping to change over time other teachers' possibly longstanding negative attitudes and beliefs about data-teaming in general and, in so doing, assist in counteracting the inhibiting effects of "PLC-lite" sub-cultures in schools.

Provide focused professional development (PD) programs to teacher teams to support teachers' ongoing "need-specific" data-teaming knowledge and skills development. School leaders can work to identify existing school district–sponsored professional development programs and/or other available professional learning opportunities (such as might be offered through regional education service centers and/or local universities) that can benefit teachers in focused ways by directly addressing teachers' own "need-specific" professional learning challenges. This kind of need-specific learning could potentially include, for example, assisting teachers in learning how to engage properly in systematic disaggregated data analyses and "deep data digs" to inform the development of differentiated instruction and targeted, customized interventions to meet the specific learning needs of individual students. Additionally, smaller school districts often pool their professional development resources by participating in "multi-district consortiums" in which individual districts share professional development programs and related resources with each other as a concerted means to support teachers across a wide geographical region. So, school leaders working in smaller districts should seek to maintain current information on the availability of some of these "multi-district" professional development programs and resources.

Encourage teachers to develop their own "just-in-time", customized professional development (PD) modules. Cultivate in teachers a desire to identify specific learning topics in high-priority professional learning need areas in their own grade-level teams and then proceed to develop their own "just-in-time", customized professional development (PD) modules on these high-priority learning topics. Identifying high-priority professional learning need areas and then collaborating together to develop their own customized PD modules that teachers can use to inform their own professional growth are excellent ways for teachers to nurture strong collegial relationships and open communication avenues within and across their grade-level academic teams. Furthermore, fostering a school-wide climate of positive team communication between and among teachers on a campus (as well as throughout a school district) can be an excellent way to build strong team rapport and nurture confidence among teachers on the substantive advantages of communal learning. In addition, school leaders can take advantage of the greatly expanded professional learning opportunities afforded by today's internet-enabled communication tools (such as Wikis, Twitter, blogs, LinkedIn, Facebook, webcasts, and podcasts) through encouraging teachers to become actively involved in social media networking and collaborative sharing of data analysis and instructional planning "best practice" ideas and insights.

Emphasize and celebrate teachers' ongoing involvement in team-centered "instructional capacity–building" as a critical component of your school's overall teaching and learning improvement efforts. School leaders can significantly enhance their school's overall teaching and learning improvement progress through finding multiple opportunities to emphasize the inherent value of teachers' involvement in instructional capacity–building activities and showcasing the instructional capacity–building accomplishments of their teaching staff. In addition, school leaders can celebrate their teachers' instructional teaming successes through publishing congratulatory write-ups in school newsletters and online campus websites, and recognizing teachers and teacher teams at school community events. Finally, campus administrators can work to provide teachers with opportunities to share their successful data teaming and related instructional capacity–building best practices with other schools in the district through engaging in "site visitations" and "best-practice presentations" to educators at other campuses.

Conclusion

In this article I have sought to highlight the professional learning advantages that can accrue to school leaders through applying principles of *design research–based school improvement thinking* in conjunction with *data-teaming collaborative inquiry processes* as concerted means to effectively address persistent student-learning problems in elementary and secondary school contexts. In particular, the hypothetical "design-based school improvement case study" profiled and discussed in this article was presented as one case exemplar to demonstrate the kinds of new insightful understandings that groups of educators—working together in intentional ways as focused "instructional improvement teams"—can attain through employing team-centered data mining and root-causal analysis strategies in tandem with design-based school improvement logic and operational decision-making steps to reveal underlying *context-specific problems of professional practice* that can often fuel surface-level student-learning problems. Importantly, the design-based school improvement data-teaming efforts engaged in by educators in the Ramirez Elementary case study resulted in a specific *instructional improvement intervention design* that Ramirez educators were able to implement to address the specific underlying "context-specific problem of professional practice" challenges that were revealed through their campus team's design-based school improvement investigation.

The "design-based school improvement data-teaming" approach utilized in the hypothetical case study presented and discussed in this article may provide a potentially useful teaching and learning improvement "application roadmap" to school leaders working in a variety of real-world elementary and secondary (middle/junior high and high school) organizational contexts. Specifically, this approach may have some practical value to educators who are interested in leveraging the analytic power of educational design thinking in tandem with data-teaming processes to positively inform their own educator teams' efforts to identify and address possible underlying, root-causal problems of professional practice that may be contributing to their students' persistent learning problems. Finally, the set of *practical leadership strategies* to support educators' design-based school improvement data-teaming practices derived from the collective case study analysis and discussion may be useful to current school leaders interested in working to further enhance their own ongoing efforts in their school communities to transform, invigorate, and support educators' teaching and learning professional practice.

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