Cross-Disciplinary, Whole School Education Reform in Secondary Schools: Three Critical Components

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ABSTRACT: The Whole School Success Partnership (TWSSP) worked to develop practices and cultures that emphasized student success in five middle and high schools. Because this project took place in secondary schools where teachers have disciplinary specializations, the whole school approach came with unique opportunities and challenges. Here we describe how three critical components of this project, whole-school vision; tools to translate vision into practice; and ongoing, collaborative teacher learning were enacted to meet these opportunities and challenges. We then detail outcomes revealed by the project evaluation. We found the whole-school approach provided a common ground for facilitating school-wide change and developing a shared perspective on teaching and learning. To do this, TWSSP integrated its activities with school goals and initiatives, placed teachers in high-functioning professional learning communities (PLCs), and frequently revisited a whole-school vision. The project helped teachers connect across subject-area silos, supporting and sustaining whole school reform.

NAPDS Essentials Addressed: 1. A comprehensive mission that is broader in its outreach and scope than the mission of any partner and that furthers the education profession and its responsibility to advance equity within schools and, by potential extension, the broader community; 2. Ongoing and reciprocal profess sional development for all participants guided by need; 3. A shared commitment to innovative and reflective practice by all participants; 4. Engagement in and public sharing of the results of deliberative investigations of practice by respective participants.

For many secondary students, the transition from classroom to classroom comes with changes in teacher expectations, pedagogical practices, and instructional goals. A student transitioning from English to physics may not only have to adjust her frame of mind to address different content, she may also have to adjust to a different classroom culture and a different definition of what it means to be a successful learner. Greater consistency across classrooms around a common understanding of effective teaching and learning could free students from some of the challenge of adapting learning behaviors for a particular classroom so they can focus on developing their skills and understanding of content.

The Whole School Success Partnership (TWSSP) was a collaboration between university faculty and school districts designed to address some of the inconsistencies secondary students encounter in their educational experiences and work toward a more connected, goal-oriented experience for students. In order to do so, the project took the approach of working with as many teachers as possible in a few schools, rather than a few teachers in many schools, with the overall vision of changing cultures and practices across entire schools. In doing so, project leadership worked to integrate the findings from multiple research studies to impact teachers' and principals' fundamental ideas about subject matter, teaching, and learning, with the overall goal of creating school cultures committed to each student's success.

A number of resources informed our thinking, including reports of schools that achieved large improvements, despite challenging demographics (The Education Trust, 2005; Waits et al., 2006). Practices discussed in these reports included training and recruiting good instructional leaders, providing mentoring support for new teachers, reevaluating course assignments and ensuring that more experienced teachers taught more foundational, lower-level courses, and developing and using common assessments. These insights provided project leadership with ideas about changing practices at the system level. Other resources provided guidance on pedagogical strategies that would be the most likely to make positive impacts at the building and school levels, where project leaders concentrated their efforts (Chenoweth, 2007, 2009; Hattie, 2012). This research motivated TWSSP leadership to embrace the whole school focus and adopt the five attributes of successful schools articulated in Karin Chenoweth's work: (1) Keep a "laser-like" focus on what students need to learn; (2) collaborate on how to teach; (3) assess frequently to see whether students have learned;

(4) use data to inform instruction; (5) build personal relationships (Chenoweth, 2007, 2009).

Whole school professional development takes on a unique "flavor" in a secondary context since middle and high school teachers have content specializations. Thus, a whole-school secondary Professional Development (PD) approach comes with particular opportunities and challenges. Here we describe these opportunities and challenges organized around our three "critical components" of secondary whole-school PD: I. Whole-school vision; II. Tools to translate vision into practice; and III. Ongoing, collaborative teacher learning. These components are not new, but take on specific nuances when applied to work among teachers with a range of disciplinary expertise in a middle or high school setting. Work related to these components, grounded in the research on high-leverage instructional practice, teacher collaboration, and principal leadership (Bransford, Brown, & Cocking, 2000; Hattie, 2012), allowed teachers to capitalize on their specializations while building a shared language and vision.

The intention of this paper is to provide a description of the project, as well as to share some outcomes and recommendations for others taking on secondary school reform. We first describe TWSSP, then detail how the three critical components were enacted in the project and share some related findings from project evaluation. Finally, we offer considerations for others developing whole-school secondary professional development programs.

Initiative for the Whole School Success Partnership

TWSSP built on two science teacher education reform projects, the North Cascades and Olympic Science Partnership (NCOSP) and the College Readiness in Science Partnership (CRISP). These projects utilized expertise of teacher leaders to lead professional learning communities (PLCs) within their schools. Over the course of these projects, leadership became distributed among all teachers involved in the PLCs, which created high quality collaboration among science teachers. Student achievement, measured through standardized science test scores, improved in most schools, exceeding the state average (Hanley, Buly, & Thal, 2009; Nelson & Warren, 2012).

The principals involved in NCOSP and CRISP had increased their understanding of effective science teaching through these projects and were interested in expanding their expertise in other subject areas. Science teachers also expressed a desire for improved collaboration and opportunities to learn how to make connections across disciplines. At the conclusion of these projects, principals of partnering schools asked to have all teachers in a school collaborate around success for all students. They wanted to focus on teaching and learning practices based on current cognitive and educational research that would help them to create a more seamless learning experience for students as they move from classroom to classroom. This whole school focus was a novel professional development approach because it allowed for both disciplinary knowledge/skill development and interdisciplinary collaboration among teachers.

TWSSP participants included all principals and science, math, and English Language Arts (ELA) teachers from five schools in the northwest region of Washington State. In order to make initial decisions regarding which middle and high schools to focus on for TWSSP, project leaders used the School Capacities for Improvement Survey of Science (SCI-SoS). The SCI-SoS is a survey developed in-house during NCOSP to help educators collect data they can use to inform their reform efforts (Hanley et al., 2009). The SCI-SoS measures five components of "school capacity" that research has shown to be necessary for improved science teaching and learning in schools: (1) shared responsibility for all students' success, (2) resources, (3) teachers' knowledge and skills, (4) colleagues' knowledge and skills, and (5) professional development. Each school was ultimately chosen because it had the capacity, evidenced by results from the SCI-SoS, to build a strong vision linking shared leadership to whole school success.

Participating schools included a middle and high school in a small border city, a middle school in a small agricultural town, and a middle school, high school, and K-12 school from a rural district on the coast. The project had two discipline-based goals: (1) Improve teachers' subject knowledge and pedagogy in their academic subjects, and (2) Improve principal and assistant principals' instructional leadership skills specific to mathematics, science, and English Language Arts (ELA)/social studies. In addition, the work was grounded in a fundamental, underlying goal: (3) Ensure that all schools have an articulated and shared vision that reflects a belief in students' capacity to learn.

Professional Development Structure

For large-scale, sustained change to take place, professional development must be ongoing and job-embedded (rather than a "one-shot" workshop), in which learning opportunities are interspersed with time to practice new strategies (Wei, Darling-Hammond, Andree, Richardson, & Orphanos, 2009). Therefore, TWSSP professional development combined week-long Summer Academies with academic-year Saturday workshops and regular Professional Learning Community (PLC) meetings. During Summer Academies, teachers spent roughly half of their time gaining mastery of disciplinary concepts and skills in domain-specific *content immersion sessions* and the other half of their time together in *pedagogy sessions*, developing common understandings of best practices in teaching and learning.

Teachers split into disciplinary groups (science, math, or ELA) for content immersion sessions and learned new content specific to those disciplines. Specific topics were new each year. Examples for science, math, and ELA were wave mechanics, non-Euclidian geometry, and biographical research and writing, respectively. Facilitation of these sessions modeled strategies that were discussed and developed in the pedagogy sessions. In the pedagogy sessions, teachers discussed research on teaching and

learning, applied their learned ideas to their specific teaching contexts, and discussed common language and frameworks for teaching and learning that would cut across the disciplines. Principals were required to attend one day of each Summer Academy and help embed supports for continuous learning and improvement in their schools throughout the academic year.

Saturday workshops took place each fall and spring to facilitate continued learning about research on teaching and learning and discussions about how teachers had been applying their new understandings to their practice. In later years of the project, TWSSP leadership also visited the schools before the start of the school year to help teachers embed new understandings in their practice and help them form support structures for continuous improvement.

Finally, the backbone of TWSSP professional development took place in Professional Learning Communities (PLCs). The PLCs were smaller groups of teachers within a school who met regularly to share strategies, analyze student work, discuss literature on teaching and learning, or otherwise support each other in making continuous improvements to their practice. Three key elements of PLCs helped foster effective communication between members: (1) shared vision and ways of working; (2) collaboration; and (3) reflective dialogue (Garmston & Wellman, 1999). Through a previous project (NCOSP), leaders had developed indicators for each of the key elements that observers and participants used to measure and reflect on, respectively, the quality of their collaboration. In addition to considering the three key elements, project leaders also incorporated research on supportive vs. developmental collaborative practices (Stevens, Kahne, & Cooper, 2006). Project leaders regularly asked teachers to think about how to shift their collaborative practices from supportive practices aimed to help teachers perform their day-to-day activities to more developmental practices aimed at improving collective instructional practices.

Critical Components of Secondary Whole School Work

Since secondary teachers are grounded in their disciplines, our whole school work with teachers relied on identifying elements of their work that cut across disciplines. The elements we identified from our work with TWSSP fell under three critical components: I. Whole-school vision; II. Tools to translate vision into practice; and III. Ongoing, collaborative teacher learning. Figure 1 shows the interactive nature of these components, in which whole school vision informs cycles of practice and teacher learning. The three critical components align with factors shown to have the greatest impacts on student learning, including teachers' content knowledge, teachers' knowledge and skills with formative assessment and feedback strategies to elicit and build on student thinking, teacher collaboration in PLCs, and improved principal leadership (Hattie, 2012). Below we describe the components, how they were instantiated in TWSSP, and some of the related outcomes from project evaluation.
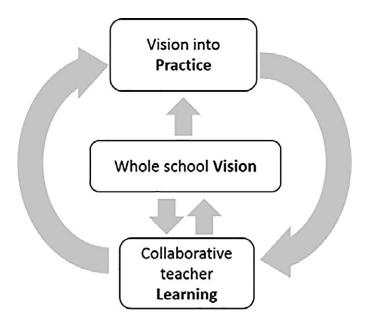

Figure 1. Three Critical Components of Whole-School Professional Development at the Secondary Level

Evaluation findings were generated through data from student assessments, classroom observations, teacher surveys, and principal interviews. Because of the descriptive focus of this article we do not go into detail on the data collection and analysis methods, but the project evaluation report, which does detail these, may be provided upon request.

I. Whole School Vision

To develop the ability of a group of teachers to work across disciplines, a shared vision must be established that provides a common purpose and language (Chenoweth, 2007, 2009; Chrispeels, 1990; Dana, Thomas, & Boynton, 2011). While aspects of instruction are discipline specific, a focus on the aspects that span disciplines helps both teachers and students. Such focus provides a coherent experience for students as they navigate the different languages and structures of the disciplines. One TWSSP teacher claimed,

> Our students are far better off than they were three years ago because of our collaborative focus through TWSSP. Students now go from class to class with more clarity because we have come together as a school to make learning clearer to students.

Elements of building and maintaining a whole school vision were: (a) shifting the focus from the teacher to the student, (b) developing a shared commitment to evidence-based improvement at the classroom level, (c) fostering growth mindset in students and teachers, and (d) developing strong leadership focused on teacher learning in each school.

a. Student focus. For TWSSP, the common vision began with a subtle but important shift of focus. Rather than teachers and

administrators focusing on their actions, the focus was placed on student learning. Student learning is almost always the focus for teachers, but it is not always intuitive for teachers to examine their instruction from the lens of how it impacts students. John Bransford and colleagues (Bransford et al., 2000) reviewed the vast research findings about human learning. Their analyses revealed three areas that informed our emphasis on student learning: (1) Students come to the classroom with preconceptions about how the world works, (2) Students must have a well-organized, deep grounding in factual knowledge, and (3) Students must monitor their understanding and progress as they learn, especially as they use their new learning for solving problems. These key findings established the foundation for all TWSSP activities and were revisited frequently, thus helping maintain a focus on students rather than teacher actions.

b. Shared commitment to evidence-based improvement. For teachers to make use of the three key findings about how people learn, TWSSP PD emphasized formative assessment as a tool for surfacing and responding to preconceptions, foundational knowledge, and learning frameworks. Formative assessment was chosen as an area of focus because it has been identified as a high-impact practice in education research (Black & Wiliam, 2010). According to Forzani (2014), effective instruction starts with a change of perspective, in which "students' ideas are taken as the starting place for instruction and viewed as essential resources for classroom learning, and the teacher's job is seen as bridge-building from what students already know and can do to new ideas and skills" (pp. 359-60).

A focus on formative assessment meant that instead of thinking first about what the curriculum sequence laid out, teachers began to ask, "How can we determine what our students already know?" and consider how this knowledge might impact the direction of their instruction. Formative assessment also requires deep content knowledge, flexible use of class time, and responsiveness to student thinking. In addition, teachers started to think about how they could determine students' progress at points throughout the curriculum instead of waiting for the results of summative tests and final projects. Formative assessment techniques provided an opportunity to make decisions about whether students needed additional support or whether they were ready to move forward. Perhaps more importantly, teachers thought about how to help students take ownership of their learning by having them monitor their thinking and track their learning.

c. Mindset. Carol Dweck (2006) coined the term "growth mindset" to describe the theory that intelligence can be developed and increased over time. A growth mindset, according to Dweck, embraces challenges, because it allows for improvement. The opposite of growth is a fixed mindset, where challenges provide occasions where you might fail or succeed, but either way you attribute it to your inherent (fixed) ability. With a growth mindset, self-image is not tied to success and comparisons to others. Effort is seen as necessary to grow and master useful skills, and not as something to be avoided. Criticism and feedback are sources of information about a current ability level and will spur improvement. Growth mindset is a helpful framework for whole-school PD because students with a growth mindset are more successful and want to learn, and because students (and teachers) can learn how to develop a growth mindset.

The TWSSP PD model was grounded in developing a schoolwide vision of effective teaching practices, including fostering a school and classroom culture where all students can learn. Embracing growth mindset at all levels became an important component of building this type of school and classroom culture. Professional development activities first introduced teachers and principals to the research on mindset and the science of brain development. Part of this process involved teachers considering their own mindsets about themselves and their students, and teachers' perceptions of students' mindsets. TWSSP staff shared a number of resources and activities with teachers and principals to foster growth mindsets. This work not only influenced teachers' feedback to students (for example, praise/feedback is provided on effort and not ability), but teachers' own mindsets as well. To encourage growth in students, teachers had to challenge their assumptions about learning and their own abilities.

d. Principal leadership. School leadership, beginning with the principal, is fundamental to student success and whole-school reform. TWSSP principals and assistant principals (both considered "principals" in this paper) were very active in helping unify staff around, and enacting, a common vision. The TWSSP PD model depended on principals effectively performing five key functions: (1) shaping a vision of academic success for all students; (2) creating a climate hospitable to education; (3) cultivating leadership in others; (4) improving instruction; and, (5) managing people, data, and processes to foster school improvement (Wallace Foundation, 2011). These are challenging functions that required some principals to redefine their roles and their interactions with teachers.

TWSSP began at the same time that the state implemented a mandated teacher evaluation program. This system, the navigation of which was an acute need among TWSSP principals, emphasized collecting evidence of classroom teaching and learning with respect to state-adopted instructional frameworks for the purpose of improving teaching and learning. TWSSP project leaders worked with principals to align PD with these state instructional frameworks. Through separate principal sessions during the Summer Academies and through networking among principals during the academic year, principals shared tools and information with each other. They exchanged ideas about how to collect high quality data through classroom observations, how to provide effective feedback to teachers based on those classroom observations, and how to allocate PD resources. TWSSP's focus on research-based instructional strategies helped principals and teachers identify PD needs to engage all math, science, and ELA teachers and change the culture of teaching and learning in each school.

Project evaluation findings related to whole-school vision. Perhaps the most telling evidence of schools developing and operating

under unified visions comes from interviews with the principals during years 2 and 3 of the project. In these interviews, all principals agreed that the student focus promoted by TWSSP through the framework of formative assessment aligned well with their school goals. Further, the alignment of TWSSP activities with the state mandated instructional frameworks that provided the backbone to the state's new teacher evaluation program helped to cement and provide buy-in for a unified vision focused on students. As one principal commented,

> TWSSP is a tool to help teachers meet mandates and best practice goals already in place…and provides resources to build our internal capacity for change…TWSSP provides external validation of the importance and need for research-based practices, such as [those] embodied in the instructional frameworks.

At the end of the second year, principals commented that in Year 3 they wanted TWSSP to help teachers with strategies to increase student engagement and ownership of their learning. Student engagement was one of the components of the state instructional framework, which became a major focus for TWSSP's work with teachers in Year 3.

II. Tools to Translate Vision into Practice

A shared vision must be put into practice to positively affect student learning. TWSSP PD activities made frequent use of two tools to help teachers plan and implement pedagogies from the common frameworks described above. These are: (a) practitioner-based learning progressions, and (b) a model of a research-based lesson cycle. In addition, content immersion sessions (c) helped teachers increase their disciplinary understanding so they could use the tools to effectively plan their curriculum and pedagogy.

a. Learning progressions. All TWSSP teachers created unit learning progressions to provide a framework for linking their disciplinary framework to formative assessment planning. TWSSP project leaders drew from a learning progression template first developed by Popham (2008), which starts with the identification of a "Big Idea" for a unit. Most Big Ideas were drawn directly from Standards (National Governors Association Center for Best Practices & Council of Chief State School Officers, 2010; NGSS Lead States, 2013). Teachers then plan backwards from that big idea (McTighe & Wiggins, 1998; Wiggins & McTighe, 2008), identifying smaller-grain learning targets that build up to it.

Although teachers referred to published multi-year, research-based learning progressions (National Research Council & Committee on a Conceptual Framework for New K-12 Science Education Standards, 2012), it is important to note that their learning progressions were not meant to describe research on common developmental pathways for students, and usually represented smaller grain sizes (one learning progression per unit) than published, research-based learning progressions.

Further, the learning progressions tied curriculum and pedagogy together by stipulating success criteria (what it looks like to meet the learning target) and formative assessment tasks for each learning target (Fig. 2). Thus, the learning progressions guided teachers in sequencing their content, as well as incorporating checks for understandings along each step in the sequence. Importantly, the learning progressions were considered living documents and teachers revised them based on the actual student progressions teachers observed in their practice.

Learning progressions were a foundational element of TWSSP professional development. Large parts of the first Summer Academy were devoted to teachers learning about and creating learning progressions for units they were teaching during the subsequent academic year. Many teachers took advantage of optional "learning progression days" that preceded the second Summer Academy. Teachers would consult their learning progressions when planning formative assessment practices in individual lessons. As one teacher reflected, "Thinking about learning targets forces me to break the learning for my students into manageable chunks and it gives students the roadmap of how to attain learning."

b. Research-based lesson cycle. To represent what research on teaching and learning (Bransford et al., 2000; Wiliam, 2011) looks like in practice, we created a model of teaching we call the Research-Based Lesson Cycle (RBLC, Fig. 3). The RBLC describes a teaching sequence in which evidence of student learning is constantly being collected and acted upon to inform instruction. The RBLC was used to frame aspects of teaching and learning discussed in the pedagogy sessions and connect them to each other. Midway through the project, elements of the newly adopted state instructional frameworks were mapped onto the RBLC in order to help teachers and principals to more easily connect TWSSP work to state requirements. A lesson planning template based on the RBLC helped teachers plan for the incorporation of these facets of effective instruction in their daily lessons.

In essence, learning progressions helped teachers conceptualize their curricula, while the RBLC helped them think about the pedagogy associated with those curricula. Because these planning frameworks prompted teachers to clarify their learning intentions and align them to assessments, they catalyzed discipline-based conversations between teachers in the same subject area. However, because the tools themselves were common for all teachers, they also catalyzed productive cross-disciplinary discussions about implementation (methods for sharing learning targets, generating artifacts of learning, etc.)

c. Grounding pedagogy in disciplinary content knowledge. While teachers built their understanding of common pedagogical and planning tools, TWSSP PD was also grounded in opportunities to deepen content knowledge. Research on PD indicates that intensive content immersion has a positive impact on teacher content knowledge (Hilda Borko, 2004; National Science Foundation Directorate for Education and Human Resources, 2010; Silver, Hansen, Herman, Silk, & Greenleaf, 2011). Content immersion was shown to have a statistically significant
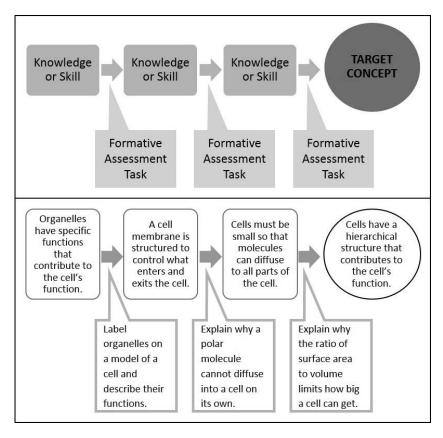
Figure 2.   Learning Progression Template (Top) and Sample (Bottom)

impact on teachers' mathematics content knowledge for teaching, based on the University of Michigan's Mathematics Knowledge for Teaching assessment (Weaver & Dick, 2009). Deep understanding of the concepts of the discipline is essential for teachers to foster students' conceptual understanding (Ball, 1990; H. Borko & Putnam, 1996) and is linked to student performance (Hill, Rowan, & Ball, 2005; Weaver & Dick, 2009).

The Common Core State Standards (National Governors Association Center for Best Practices & Council of Chief State School Officers, 2010) and Next Generation Science Standards (NGSS Lead States, 2013) provided the focus for disciplinary content learning, and the topics for the content sessions were

based on surveys of teachers' knowledge of, and perceived needs around, these standards. The content sessions also gave teachers the chance to see what the pedagogical tools (learning progressions and RBLC) would look like in practice in their discipline, as the content immersion facilitators modeled the use of those tools.

Project evaluation findings related to translating vision into practice. One source of evidence that TWSSP helped teachers implement some of these tools to better understand student thinking and adapt instruction accordingly comes from surveys that were given at the beginning of the project and at the end of each Summer Academy. When asked to rate their understandings of several elements of effective instruction, teachers rated
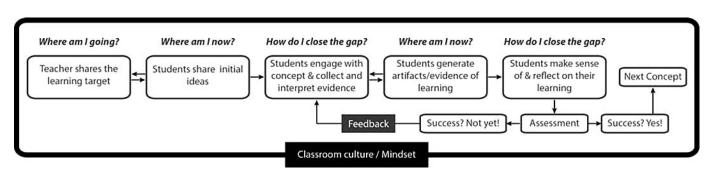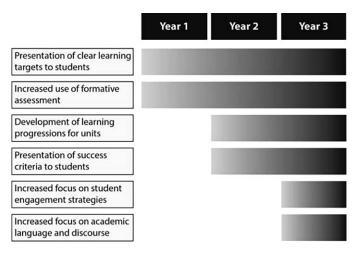

Figure 3.   Research-Based Learning Cycle (RBLC)

Figure 4. Changes in Teachers' Mean Ratings About Their Understanding of Elements of Effective Pedagogy. Bars indicate years in which significant increases were observed in teachers' self-ratings, from the beginning to the end of the year.

themselves statistically higher, on average, in later years compared to earlier years of the project, specifically in the areas of formative assessment, feedback to students, and student self-monitoring and regulation.

On surveys, teachers highlighted several areas that had the greatest impact on their instruction. Their responses illustrate a shift over the three years from working on learning targets and formative assessment to building from these with learning progressions, success criteria, and strategies to increase student engagement and discourse (Figure 4). These survey findings were corroborated by classroom observation data. Further, teachers' ratings of their own practice on surveys indicated a general trend toward uptake of high-impact practices in most areas from year 1 to year 3 (Figure 5). For example, one teacher mentioned a heightened emphasis on formative assessment: "Formative assessment is now a regular part of my instruction. Students in my classroom want to see the data on how the class did on an exit task or pre and post test." Another highlighted her strategic use of feedback: "I've learned how to provide feedback to move learning forward. By giving students feedback that is specific about how to improve, and not tying it to a grade, students view the feedback as a prescription for improvement." A third teacher mentioned increasing attention to student discourse: "Focus on quality student talk has increased ownership of learning and has really created more understanding among students, which, in turn, has allowed me to gain understanding into their learning."

Observations and surveys suggest teachers worked diligently to align their practice with educational research through TWSSP activities. Although formative assessment strategies (sharing learning targets, collecting evidence of student understanding, providing feedback that moves learning forward, and student peer and self-assessment) were new to teachers at the beginning of the project use of these strategies was an integral part of their classroom practice three years later. Teachers worked to ensure strategies were implemented consistently in order for students to

have a seamless experience across classrooms. Alignment of instructional practices between classrooms and buildings changed the nature of educational experiences for students, allowing them to navigate the content more easily when moving from subject to subject. These findings align with the data from principal interviews. In Years 2 and 3, principals noted changes in their teachers' classroom instruction, primarily in terms of specifying the learning targets and success criteria for each lesson and sharing those with their students. Principals attributed student learning gains on assessments to this work.

As with any PD project, teachers did not feel they were finished refining their practice at the end of TWSSP, and some of our evaluation measures identified potential next steps. These included the need to further shift the locus of control to students to increase their ability to collaboratively construct their understanding and monitor their own learning. On the Year 3 survey, teachers reported being least skilled in fostering the ability of students to serve as instructional resources for one another and developing strategies to help students monitor and track their own learning. Project leaders also encouraged teachers to be transparent with students about the instructional changes they have been making, the rationale for those changes, and the intended benefit for students. Since TWSSP teachers worked with middle and high school students, it was particularly important that students understood why they were being asked to think and work in new ways so they could buy into the changes in the classroom learning environment. It was important to communicate to both students and parents about the purpose for changes in instruction that put more onus on students.

III. Ongoing, Collaborative Teacher Learning

In order to ensure teachers had the opportunity to incorporate instructional strategies into their classrooms, they were expected to engage in our third critical component, ongoing, collaborative teacher learning. This component consisted of participation in two elements: (a) Professional Learning Communities (PLCs) and (b) classroom observation and feedback during the school year. These practices allowed collaborative teacher learning on an ongoing basis, beyond formal PD events, as is recommended in the research on effective professional learning by teachers (Wei et al., 2009).

a. Professional learning communities. Professional learning communities (PLCs) were one of the mechanisms used to promote ongoing teacher learning and collaboration throughout the school year. Teachers were asked to re-envision PLC meetings as a mechanism for teacher learning (instead of glorified staff meetings), in order to help them translate the ideas gleaned in TWSSP PD events into practice in their own unique classroom and school environments. Project leadership initially used a PLC structure adapted from Wiliam (2007) that required teachers to meet once monthly for 90 to 120 minutes. This protocol requires each teacher to prepare by creating and implementing an instructional action plan based on an identified student need. PLC meeting time is then spent discussing results of each
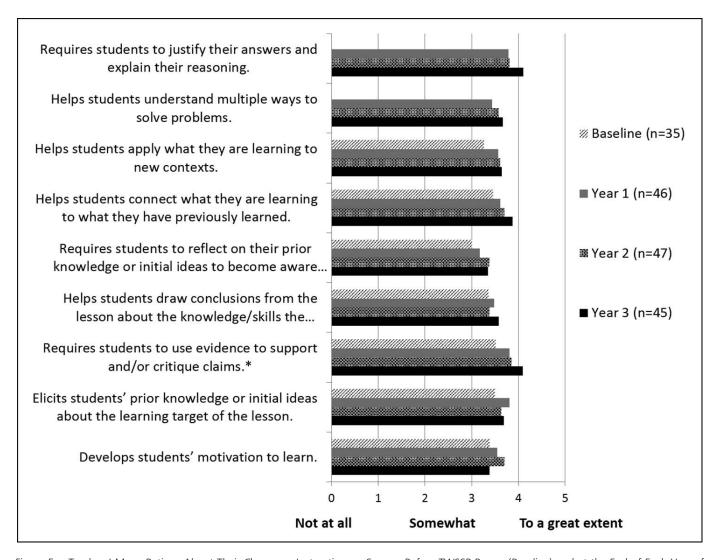
Figure 5. Teachers' Mean Ratings About Their Classroom Instruction on Surveys Before TWSSP Began (Baseline) and at the End of Each Year of Professional Development. *Indicates statistical significance at p<.05 based on a one-way ANOVA from Baseline to end of first year (1), second year (2), and third year (3). The first item was not asked in the baseline survey

implementation, often by collaboratively looking at student artifacts. While this structure served the needs of most teachers during the first year, adjustments were made in subsequent years to more closely tie teachers' PLC work to their area of focus with respect to the state instructional frameworks.

In years two and three, project leaders worked closely with principals from each partnering school to ensure TWSSP PLC work dovetailed with district and building foci. Each summer, teachers assessed their current understanding of the area of focus for their school, tied to the statewide instructional frameworks, and determined the area of most concern in their individual instruction. With assistance from principals, cross-disciplinary PLC groups were formed around common areas of instructional improvement. This change in PLC structure was energizing for teachers and helped support the instructional focus for each school. As one teacher commented at the end of the project, "TWSSP work aligned with our district. . .[it] focused on student engagement

and allowed me to connect learning progressions, learning targets/ success criteria, and formative assessments into my new units."

TWSSP also adopted a cycle of inquiry approach to guide PLC work in years two and three. Dana et al. (2011) define a cycle of inquiry as a:

> cyclical process of posing questions or wonderings, collecting data to gain insights into their wonderings, analyzing the data along with reading relevant literature, taking action to make changes in practice based on new understandings developed during inquiry, and sharing findings with others (p.5).

After forming PLCs around an area of common instructional need, groups developed a schedule that would allow them to meet more frequently for shorter periods of time and to combine their PLC work with a cycle of observation and

feedback. Teachers began collecting and analyzing evidence of student thinking and used these data to drive the cycle of inquiry. The cycle of inquiry model provided impetus and momentum for interdisciplinary groups. Some PLCs found the experience of engaging in a cycle of inquiry with interdisciplinary partners so invigorating they chose to continue to meet even after TWSSP funding ended. Teachers and principals appreciated the tight connection between TWSSP professional development, improved student learning, and the work that was already being done in schools around implementing the new statewide instructional frameworks.

b. Observations and feedback. Research suggests teaching improves at a greater rate when teachers deprivatize their practice and open it up to observation by and feedback from their peers (Garmston & Wellman, 1999). Though the majority of TWSSP teachers were reluctant to open their classrooms for observations and feedback until years 2 and 3 of the project, after trust had been established between teachers and project leadership, most eventually found value in engaging in this type of collaboration as a way to surface student thinking and improve instruction. Further, when the cycle of inquiry approach was adopted, teachers used peer observation and feedback to improve an aspect of instruction, such as student discourse, that spanned disciplines. Cross-disciplinary PLCs first discussed successes and challenges with the chosen aspect of instruction, then read and discussed pertinent articles, and finally made a plan to improve that aspect of instruction. While a teacher implemented the plan, a colleague would observe, attending to aspects of teaching and learning identified in a pre-observation meeting. After the observation, teachers would meet and debrief the impact of the instructional strategy on student learning. By the end of the debrief, the teacher who had been observed identified the next step(s) in improving student learning. This Cycle of Inquiry model is not unlike Lesson Study (Lewis, 2003), in which teachers collaboratively plan, observe, and give feedback on a lesson, using student work as evidence.

Project evaluation findings related to ongoing, collaborative teacher learning. On annual surveys, teachers emphasized that their PLC provided important support and accountability to try new things. Teachers were able to share their ideas and instructional practices and receive feedback from peers. While the formal PD events introduced the research about effective instructional practices, teachers used their PLCs to deepen their understanding, experiment with new strategies, get feedback from their colleagues, and revise their thinking and practices.

On the final survey, a majority of teachers identified their PLC as having the most significant impact on their instruction, out of all TWSSP activities. Teachers felt accountable to their PLC members and followed through on using new strategies in their classrooms, at least in part because they knew they would be reporting on their progress at their next PLC meeting. Teachers came to value their PLC as a place to discuss the implementation of instructional strategies that were modeled during the formal PD events. The following quotes illustrate the varied ways in which PLC work catalyzed improvements to teachers' practice:

PLCs have had a huge impact on my instruction. My PLC held me accountable for improving my practice. They gave me support and suggestions. They asked me questions to deepen my thinking. The PLC format allowed us to continue our learning from the summer academy by incorporating the research we gained access to.

I have begun to see my colleagues in a much different light as we have worked together, supported one another, and pushed each other to grow.

My PLC was fantastic this year with the three, sometimes four, of us sharing student work and ideas for improving our instruction. Mixing ELA with science teachers helped us identify our students' blind spots, since we assume they know what we are talking about. They don't. If the science folks had questions for what I did, then of course the students did as well, but students don't like to ask questions.

Both the nature of the PLC work and the nature of the PLCs themselves changed over the course of the project, based on teachers' responses to surveys at the end of each school year. Though the amount of time teachers spent discussing research on teaching and learning stayed relatively high each year, the extent to which teachers worked with their colleagues on examining evidence of student learning or giving and/or receiving feedback on instructional practices increased over the course of the project. Additionally, many TWSSP teachers moved from working solely with their disciplinary colleagues to having regular interactions in interdisciplinary PLCs. These PLC discussions focused on common elements of pedagogy, rather than details of content-focused lesson preparation. Principals noted that interdisciplinary PLCs were very effective since, as one principal expressed, "teachers could no longer talk about content, and instead, had to talk about instruction."

In interviews, principals commented that the most significant benefit to them and their teachers from TWSSP was that it provided a model for teacher collaboration around student learning. Furthermore, principals mentioned the benefits to using Wiliam's (2007) PLC meeting structure, introduced to them by TWSSP, to keep their PLC time focused and productive.

Recommendations

As we completed TWSSP and reflected on the strengths and challenges of the project, we developed recommendations for other secondary schools interested in engaging in whole-school reform. The core of these recommendations includes: (a) attention to our three components, and within those components, special consideration for mechanisms for revisiting whole-school vision, tangible tools for teachers to use in their practice, and multidisciplinary PLCs; and (b) alignment with local needs and initiatives.

We recognize that the three critical components—whole-school vision; tools to translate vision into practice; and ongoing, collaborative teacher learning—were not only high leverage practices, but also that they created a synergy in support of one another to drive school change forward (Figure 1). The whole-school vision work provided common ground for doing the hard work of change as well as a shared perspective on teaching and learning. Common tools for translating the vision into practice not only propelled changes within the disciplines, they also provided the foundation for teacher learning. The ongoing nature of collaborative teacher learning helped maintain and support the shared vision.

With respect to the first critical component, we recommend special attention to the mechanisms by which schools revisit the whole-school vision, and to revisit that vision often. TWSSP, for example, made thinking about the whole-school vision part of the conversation each year as principals and teachers considered the initiatives and needs of their schools. How were those initiatives supporting or aligning with the vision? How did the vision help the school determine which of the needs to focus on for the year? What's more, TWSSP activities needed to feed into the whole-school vision and communicate how that was happening with principals and teachers. Because schools founded their vision on student learning, TWSSP was able to help them begin to enact their vision.

The second critical component involves the production of tangible, easy-to-use tools to help teachers connect their vision for student learning to their practice. Because of TWSSP's focus on formative assessment, learning progressions and the research-based learning cycle became viewed as essential by teachers to their lesson planning and pedagogy. The use of these tools helped maintain a focus on student learning, rather than teacher actions, and gave teachers a way to build a more consistent information stream between themselves and their students to inform their instruction.

With respect to the third critical component, ongoing, collaborative teacher learning, we recommend building multi-disciplinary PLCs into any secondary whole-school project. Teachers' work in multidisciplinary PLCs created an interdependence across the usual silos, supporting and sustaining whole school work. That interdependent work necessarily focused more on students and learning than on content, and resulted in alignment of language and pedagogy between disciplines.

Our second recommendation comes from principal and teacher feedback. Participants valued the work they were doing with TWSSP, but they also felt overwhelmed by other initiatives, some of which came with high stakes. Rather than competing with these initiatives, TWSSP worked with administrators and teachers to consider how they fit with the goals of TWSSP. We then worked to make these overlaps visible for everyone. For example, we aligned the Research-Based Learning Cycle with language from the state-adopted instructional frameworks so that teachers and principals understood how work on one supported the other. This kind of alignment allowed TWSSP to capitalize on other needs and initiatives and made time for teachers to do the work because they could use it for more than one activity.

Conclusion

The TWSSP leadership team would be the first to say that secondary whole-school work is challenging. We believe that the approach we've developed helps principals, teachers, and the students themselves focus more on the process and goals of learning, and to align these across disciplinary silos. As one TWSSP teacher said,

> Our students are far better off than they were three years ago because of our collaborative focus through TWSSP. Students now go from class to class with more clarity because we have come together as a school to make learning clearer to students. Students now expect learning targets, success criteria and exit slips. They know how to turn and talk, and talk with each other about learning. They see the benefits of learning together and thrive on knowing their own data.

These more consistent classroom experiences, combined with a clearer common vision of effective teaching and learning, might reduce some of the demands on students to adapt to individual disciplinary or classroom expectations. With common instructional supports across class settings, students can develop generalizable learning strategies and deepen their learning of disciplinary content. SUP

Acknowledgments

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