Professional Learning Communities for Science Teaching

Lessons From Research and Practice

Professional Learning Communities for Science Teaching

Lessons From Research and Practice

Edited by Susan Mundry and Katherine E. Stiles
Foreword by Page Keeley

NSTA press
National Science Teachers Association
Arlington, Virginia

Claire Reinburg, Director
Jennifer Horak, Managing Editor
Judy Cusick, Senior Editor
Andrew Cocke, Associate Editor
Betty Smith, Associate Editor

Art and Design
Will Thomas, Jr., Director

Printing and Production
Catherine Lorrain, Director

National Science Teachers Association
Francis Q. Eberle, Ph.D., Executive Director
David Beacom, Publisher

11 10 09 4 3 2 1

Library of Congress Cataloging-in-Publication Data
Professional learning communities for science teaching : lessons from research and practice / Susan Mundry and Katherine E. Stiles, editors ; foreword by Page Keeley.
p. cm.
Includes index.
ISBN 978-1-935155-00-3
1. Science--Study and teaching--United States. 2. Science teachers--In-service training--United States. 3. Professional learning communities--United States. I. Mundry, Susan. II. Stiles, Katherine E. III. National Science Teachers Association.
Q183.3.A1P757 2009
507.1--dc22
2009003259

Table of Contents

Acknowledgments

We want to thank those who helped us build this collection of chapters that tell important "stories" in science education. Our focus on professional learning communities (PLCs) in science education brings together a diverse array of stories that have the potential to impact readers from diverse contexts and settings.

Page Keeley, 2008–2009 NSTA president, provided the leadership and vision for the theme of this book, and we gratefully acknowledge her contributions to the endeavor. Her foreword provides the overarching context that frames the authors' stories.

The authors of each chapter address the topic of PLCs from their own unique perspectives, and we gratefully acknowledge their contributions to the book as a whole. Each author graciously and thoughtfully responded to our suggestions for revisions, and we want to thank each of them. We also want to thank those staff in the authors' organizations who helped prepare their final manuscripts. We know that without our own administrative assistant, Deanna Maier, this book would not have come to fruition—thank you, again, Deanna.

NSTA staff, specifically Claire Reinburg and Jennifer Horak, deserve special recognition. Claire provided the opportunity for us to compile and edit this book, and Jennifer supported us throughout the editing and production process. We are also grateful to Will Thomas and Catherine Lorrain, for creating such an attractive book. Thanks to our copyeditor, Patricia Freedman, who did a tremendous job and attended to every detail needed to finalize the manuscript, as well as our proofreader, Andy Cocke.

And, finally, we want to thank our supportive families and our colleagues at WestEd, who continue to inspire us, support our contributions to education improvement, and enable us to do the work we love.

Susan Mundry and Katherine E. Stiles
Editors

Foreword

Transitions and Transformations in Professional Learning

This book was compiled to go along with my theme as NSTA president, "Transitions and Transformation: Striving for a Science-Literate Nation." My theme was chosen to address the changes science educators have experienced in the past decade of reform and will continue to experience in the coming decade. It is about the small, incremental transitions we must make to move toward our vision of science literacy for all, as well as the deep, transformative changes that must be made in order to significantly impact teaching and learning. This book is about a transition and a transformation in professional development—the transition toward more collegial forms of professional learning that build a sense of community and the transformation in teacher learning that can take place within one of these collegial forms, the professional learning community, or PLC for short.

The rise of the PLC is one of the recent developments to appear in the landscape of professional development in schools. However, merely making the transition from mix-and-match training workshops to the formation of PLCs will not transform professional development unless we are clear about the purpose of a PLC, the roles of teachers in PLCs, and the connection to improved student learning. Many schools are starting to move away from an overemphasis on the workshop-driven approach. They are moving toward the formation of ongoing teams of teachers that meet on a regular basis to collectively improve their own professional learning for the purpose of advancing student achievement. These PLCs are the next natural step in applying what teachers have learned through workshops, institutes, and conferences. They provide a mechanism to keep the focus on continuous improvement.

Alas, in the past year many science teachers around the country have said to me, "Our districts are requiring us to be part of a professional learning community. We formed teams but we don't know what to do. I go to these meetings and all we do is talk and complain about the same old things." It was statements like this that led me to pursue a book about a topic that is very near and dear to both my work in professional development and my theme as NSTA president. I was concerned that PLCs would become just another "fad du jour" unless we could show teachers and schools how the work of PLCs can be substantive and transformative. In addition, I wanted NSTA to show how PLCs must move beyond mixed groups of teachers from *all*

Foreword

disciplines who come together to explore *general* issues of teaching and learning and instead create *subject-specific* PLCs that meet the needs of *science* teachers. Although PLCs of mixed groups are important in certain contexts, NSTA wanted to show how science teacher learning needs to focus on the special kind of work that science teachers do as well as how they could use PLCs to delve deeply into the student learning problems that have a particular impact on science teaching and learning. Hence, the idea for this book was born, and my good friends and colleagues Susan Mundry and Kathy Stiles heartily took on the task of soliciting and editing chapters from our science education colleagues throughout the country.

The examples in this book show how PLCs, situated in the science content teachers teach, lead to deep, transformative learning by members of the group. Furthermore, they illustrate how teachers and science specialists assume shared leadership roles in supporting and sustaining their communities of practice. Research has shown us that for substantial changes in teaching and learning to materialize and be sustained, these changes must occur at the school level. Through their active role in shaping and supporting their PLCs, the chapter authors of this book show how today's science teachers, teacher leaders, science specialists, and other "critical friends" can all work together toward the common goal of improving student learning and opportunities to learn. With the current increased focus on science, the release of this book is just in time to meet the needs of science teams in schools large and small, urban and rural, rich and poor who want to take a serious look at how PLCs can be used to improve science education for their students.

The theme of this book is important not only to my presidency but to NSTA's larger mission. NSTA's John Glenn Center for Science Education was named after Senator Glenn to honor his lifelong commitment to science education. The professional development vision set forth by Senator John Glenn and the National Commission on Mathematics and Science Teaching for the 21st Century, which he chaired, proposed an innovative action strategy back in the year 2000: "Local professional Inquiry Groups should be formed to provide venues for teachers to enrich their subject knowledge and teaching skills" (*www.actionbioscience.org/education/glenncomm.html*). Now with this book, science educators can help schools realize the vision of professional development called "inquiry groups" that was proposed almost a decade ago by Senator Glenn. From inquiry groups to the substantive models of PLCs described in this book, we are all on a continuous journey to work together to build better opportunities for teachers to experience the transformative power of working and learning in collaborative settings. It is my sincere hope that you will read and share this book with others and help make Senator Glenn and NSTA's compelling vision for professional learning transform your school.

Page Keeley
National Science Teachers Association President, 2008–2009

Introduction

Susan Mundry and Katherine E. Stiles

This book is a collection of chapters that tell the story of how leaders in science education are building professional learning communities (PLCs) to strengthen teaching and student learning. We have found in our own work that the characteristics and attributes of PLCs have applicability in many contexts—schools, districts, professional networks, and other organizations. Much has been written about the power of PLCs as they contribute to creating communities of learning and practice within the walls of schools. In this book, our goal has been to share the stories of educators who have embraced the principles of PLCs and integrated them into school contexts *and* other settings—district, regional, and state initiatives—where PLCs that contribute to changes in cultures and transformation of science education are being developed.

Overview of Chapters

Overview of Book Chapters				
Chapter	**Location**	**Focus**	**Content**	**Context**
1: The Promise of PLCs	National	Research on PLCs	Science	All science education professionals
2: Late-Start Mondays	Indianapolis, Indiana	Whole-school PLC	Cross-curricular Project Based Learning	Teachers of grades 10–12, administrators, and articulation with teachers of grades K–9
3: Teacher Learning Collaborative	California	Teacher Learning Collaborative	Science Lesson Study	Teachers of grades K–12 and higher education partners
4: Professional Development Cadres	Los Angeles, California	Developing professional development leaders	Science Inquiry	Teachers of grades K–12 and higher education partners
5: PLCs Through Partnerships	Washington	School-university partnership developing teacher leaders	Science	Teachers of grades K–12, administrators, and higher education partners
6: PLCs and Meaningful Reflection and Collaboration	Arizona	Understanding the factors that support quality implementation of PLCs	Mathematics and Science	Teachers of Grades 9–12 and higher education partners
7: Developing Teacher Leaders for PLCs	South Carolina	Roles of science leaders and teacher leaders in promoting PLCs	Science	Teachers of grades K–12 and science leaders
8: K20 Model	Oklahoma	Statewide school-university network supporting whole-school reform through PLCs	Science	School-based learning teams and university partners K–20

Introduction

In Chapter 1, we define characteristics of PLCs and their various forms and common features cited in the literature. We discuss research findings that suggest that such communities can improve school culture, teacher knowledge, and student achievement, and we make the case that PLCs show promise for supporting continuous teacher professional development and improvement of teaching practice and student learning.

The subsequent chapters provide illustrations of PLCs in action, starting with the story of a single large high school that created a schoolwide PLC, and moving to several district, regional, and state initiatives that are developing PLCs in a variety of ways to address different purposes.

We are heartened by the in-depth work that the chapter authors are doing with teachers and school leaders to build PLCs and see these developments as a promising way to leverage teacher professionalism and knowledge and improve student results. For example, in Chapter 2, Somers and Plyley point out how a whole-school PLC avoids "islands of innovation" and creates the expectation that everyone will work together to grow and improve practice. They describe the process by which a large, urban high school in Indianapolis, Indiana, overcame the challenges and formed a PLC focused on improving student results and promoting teacher learning and collaboration. Their guiding philosophy and approach was to create a schoolwide PLC. The authors describe ways in which science teachers expanded their roles in the schoolwide PLC by extending connections with middle and elementary teachers, engaging in cross-curricular work with other department teachers, developing performance-based assessments, and showcasing lessons across departments and grade levels.

In Chapter 3, DiRanna, Topps, Cerwin, and Gomez-Zwiep discuss how their PLC focuses on making changes in lessons based on student results. They describe a professional development strategy called the Teaching Learning Collaborative (TLC) that uses tools and processes to ensure that the TLC learning community stays focused on specifying learning outcomes, planning quality science lessons, assessing student learning, and taking action when students do not learn. Based on data, and beginning with the end in mind, teachers sequence specific questions and activities to link students' prior knowledge to the learning sequence concepts. The TLC participants team-teach the lesson, analyze student work from the lesson to identify a range of student understandings of the concept, and use the data to make improvements in lessons.

Several of the chapters provide evidence that the leadership for sustaining PLCs can come from inside schools and that outside facilitators (e.g., resource networks, professional developers, researchers, and technical assistance providers such as content experts) can support district-based teacher leaders and science leaders so the capacity is there long after funding and external helpers are gone. For example, in Chapter 4, Baxter Lauffer and Lauffer describe the tools and processes developed by

staff at the University of Wisconsin—Madison, to support their work with K–16 science educators in the Los Angeles Unified School District. The focus of the work was building a PLC among the professional development providers for this large district. This work involved developing a shared vision of the professional development model, working with university faculty, and making ongoing improvements in the system to prepare teachers to teach inquiry-based science units. Their external support resulted in a PLC that has sustained the focus on teaching and learning within schools amid dramatic changes in the district.

Chapters 5, 6, 7, and 8 describe how districts in Washington, Arizona, South Carolina, and Oklahoma are working in partnership with institutes of higher education and, in one case, the state department of education, to develop the leadership and capacity for local schools to implement and sustain PLCs. In Chapter 5 we learn how teacher leaders in Washington are supported within their own PLCs as well as provided with the tools and processes to lead PLCs in their own schools. Landel and Nelson describe the approaches developed by the North Cascades and Olympic Science Partnership at Western Washington University, which involves 28 school districts and a host of partners in developing teacher leaders and PLCs in schools. The emphasis is on supporting effective professional development and curriculum implementation to improve science learning.

In Arizona, researchers are helping to uncover what it takes to facilitate PLCs effectively. In Chapter 6, Oehrtman, Carlson, and Vasquez describe the experiences of a large Math and Science Program that has been developed around building PLCs among mathematics and science teachers. They share data that provide evidence of how the model has helped raise the quality of teaching among participants and contributed to the delineation of the knowledge and skills of effective facilitators for PLCs.

As described in Chapter 7, South Carolina science leaders and teacher leaders play key roles in creating PLCs. MacDougall focuses on the role of science leadership at state and district levels in support of teacher leaders in schools that have effective PLCs. He provides examples of teacher leader professional development and support frameworks that are used at district and state levels, and he illustrates the roles of teacher leaders who lead traditional teacher teams to become PLCs.

In Chapter 8, Atkinson, Cate, O'Hair, and Slater describe a school-university network of over 500 schools in Oklahoma, called the K20 Model, that focuses on school renewal at a state level. They describe their model for supporting teacher collaboration through communities of practice that increase science teacher learning and enhance student engagement. Their research shows improved teacher efficacy, teacher content knowledge, and use of inquiry as well as increases in students' science interest and learning on classroom and state assessments.

In the examples throughout the book, we see the opportunity to invigorate and engage science teachers and all educators in ongoing growth and improvement.

Introduction

The "ideal" impact of this collection of stories would be for readers to develop a vision of PLCs in their own contexts and initiatives, glean the lessons learned from each story, and implement strategies that support teachers and schools to move toward becoming PLCs.

To support you, the reader, in this endeavor, we suggest the following reflection questions to help you engage with the "lessons learned" in Chapters 2–8:

- How is your context similar to and different from the one described in the chapter? How can you translate the contextual issues identified in the chapter into your own site? What structures exist within your context that both support and inhibit the implementation of PLCs?
- How would you describe your own culture (e.g., What are the norms for collaboration? How do people respond to change?)? What kind of culture existed in, or was developed, in the chapter? How close to, or far away from, that kind of culture is your organization? What would it take to move closer toward a culture that supports and sustains PLCs?
- Who is your audience (e.g., teachers, teacher leaders, administrators, higher education faculty, external consultants)? What can you learn from the chapter about how to involve and engage your audience in PLCs?
- What were the challenges faced by the chapter author(s)? How were the challenges overcome? What successes resulted? In what ways are the challenges similar to and different from those that you face? What can you learn from the solutions that were implemented?
- What are the big ideas or lessons learned from the chapter that can support you in your own efforts to implement PLCs? What can you take action on immediately? What do you need to do to enable you to institute other actions?

In addition to these reflection questions, Chapters 2–8 provide questions that expand on the themes identified here and help you reflect on your learning as it relates to the chapter's specific context and story about PLCs. To further enhance your own implementation of PLCs, the appendix provides information on resources available through the National Science Teachers Association and a description of a comprehensive website, All Things PLC, where you can find more information about developing PLCs.

Our goal in gathering this collection of chapters that tell the story of PLCs in a diversity of settings is to enhance readers' own efforts in building PLCs that strengthen science teaching and learning. We hope that through reading and reflecting on what you learned, we have achieved our goal.

Chapter 2

"Late-Start Mondays":

The Catalyst for Change in an Urban High School

John W. Somers and Sandra Plyley

"The growth of any craft depends on shared practice and honest dialogue among the people who do it. We grow by private trial and error, to be sure—but our willingness to try, and fail, as individuals is severely limited when we are not supported by a community that encourages such risks."

—Parker Palmer, *The Courage to Teach* (1998, p. 144)

Chapter 2

Imagine this scene in a large urban high school: It is the first day of fall break and the school hallways are deafeningly silent. But, tucked away in an outer wing, building trades[1] and science teachers along with an instructional coach are collaborating to develop lesson plans and materials for a unit on mousetrap cars. The building trades teacher asks one of the science teachers to grab a hacksaw from the cabinet. After several minutes, the teacher sticks her head out and sheepishly asks, "What's a hacksaw?" The room erupts in respectful laughter. This collaboration between the Science Department and the Building Trades Program offers a glimpse into a thriving and unique professional learning community (PLC) at Ben Davis High School.

Background

Isolation, fragmentation, and privatization of teaching exist as the default culture in many urban high schools across the United States. Such a culture belies an organization whose primary purpose is learning. But the road map to creating a learning culture in schools is only now being drawn. The research and knowledge base has begun to yield a rich inside look at the characteristics and dynamics of schools that function as PLCs and the leadership necessary to establish and sustain them. At the high school level, the task of creating a whole-school community of practice is often monumental and requires tremendous energy to disrupt the status quo. The story that follows describes the process by which a large, urban high school formed a PLC focused on improving student results and promoting teacher learning and collaboration. Their guiding philosophy and approach was to create a *schoolwide* PLC rather than "islands of innovation" within different departments. For this reason, they identified student learning needs and teacher professional learning practices that spanned all grade levels and disciplines.

The PLC was constructed along three systems: assessment, data analysis, and student engagement. Teachers volunteered to serve as *strand leaders* to plan, model, and support professional development activities and to assist in the construction and analysis of common benchmark assessments. This chapter describes the innovative structure used for the PLC and discusses how the Science Department expanded its role by extending connections with middle school and elementary school teachers, engaging in cross-curricular work with building trades teachers, developing performance-based assessments, and showcasing lessons involving literacy strategies.

Origin and Evolution of the Ben Davis High School PLC

Ben Davis High School is located in the Metropolitan School District (MSD) of Wayne Township in Indianapolis, Indiana. The district has a total enrollment of

[1] The Building Trades program provides instruction in carpentry, electrical wiring, masonry, and related skills.

15,119 students (K–12); 52% of the student population are minorities and 64% qualify for free and/or reduced-price lunch. The high school has an enrollment of over 3,000 students in grades 10–12 and reflects the diversity of the district.

The springboard for the Ben Davis PLC is Late-Start Mondays. Each Monday morning, the faculty engages in 75 minutes of professional development focused on a number of issues related to teaching and learning and fostering student success. Strand leaders guide their colleagues through a host of focused conversations, which include infusing lesson plans with literacy strategies, creating common benchmark assessments, analyzing benchmark data, adjusting instructional practices, and studying an array of pedagogical approaches. The current principal of Ben Davis remarked that these 75 minutes have created space in which teachers can have deep and rich conversations about their teaching that has resulted in teachers "getting really good at understanding the craft of teaching and learning and taking ownership for student achievement." This outcome of practice-based learning has evolved over the last five years and has become a core value of the Ben Davis culture.

Establishing a schoolwide PLC in a large high school poses a unique set of challenges. Some of these challenges are associated with finding common time to meet and engage in sustained professional development given the sheer number of students and faculty; the coordination of classes, program choices, and teacher preparation periods; and the resulting compression of the instructional day. By contrast, elementary and middle schools are often able to exert greater control over their schedule and time because there is more homogenization of courses and program choices. The seemingly simple act of finding and scheduling a common period for the entire school to meet is frequently a structural challenge of starting any PLC (Hord and Sommers 2008). Despite this challenge, Ben Davis teachers and administrators envied the common planning time that the middle and elementary schools enjoyed and attempted to duplicate it at the high school level.

The most sensible place to start appeared to be by establishing small learning communities at a specific grade level in order to provide common planning time and to embark on creating a PLC. In the late 1990s, Ben Davis established five small learning communities at the 10th-grade level in which teams of teachers were responsible for specific groups of students; these teachers had an extra preparation period to share and develop common learning goals, assessments, and lesson plans and to address individual student issues and difficulties. Although this arrangement conferred benefits, the administrative leadership team wanted to expand the concept to the entire school. As a former principal of Ben Davis remarked, "We knew where we wanted to go, but we didn't know how. And we wanted to know what was different about how adults function in a schoolwide learning community—how do we get to the place where teachers can have powerful conversations about the art and science of teaching and learning?" Although common time was found

for teachers to meet when the five small learning communities were established at Ben Davis, this structure only addressed grade-level issues and did not promote whole-school collaboration. Teaming can give rise to "pockets of excellence" but can have a negative effect on promoting schoolwide culture.

By the late 1990s, education leaders began suggesting that a community of practice (Wenger n.d.) or a PLC (DuFour 2004) was a viable strategy for schoolwide and organizational improvement. This idea was appealing to school reformers because both of these strategies provide a process through which individuals come together to form an intentional community in order to engage in collective learning with a focus on enhancing performance. At Ben Davis, that performance or outcome was both teacher and student learning. However, putting a PLC into practice in a high school presents a formidable challenge because the default culture in education is one of isolation (Wagner and Kegan 2006).

As a first step, a Ben Davis leadership team composed of teachers and the principal visited Adlai E. Stevenson High School in Lincolnshire, Illinois, and consulted with Richard DuFour, who, as the principal of Stevenson, had established a successful PLC. The goal for the leadership team's visit to Stevenson High School was to witness the interactions of teachers during their content team meetings. They looked at how the agenda was developed, the leadership of the meetings, and, most importantly, the interaction between teachers. They saw how teachers discussed, collaboratively, the results of common assessments. The Ben Davis leadership team was also very interested in Stevenson's program of student interventions. Their "pyramid" model scaffolded the types of educational supports students received based on escalating needs. Overall, the team was able to see how Stevenson High School functioned under their version of a PLC, and it sparked excellent discussion among the Ben Davis teachers as the team designed its PLC. From these observations and continuing conversations, book studies, and midnight musings, the principal proposed a "radical idea"—Late-Start Mondays—to the superintendent in 2003.

The idea of Late-Start Mondays was to delay the start of school each Monday for 75 minutes to provide time for the teachers to engage in professional development. As could be expected, transportation was one of the biggest hurdles to confront, but after negotiation with the central office, the idea received a "go." Students would begin school at 8:45 a.m. rather than 7:30 a.m., and bus schedules would be adjusted to reflect this change. Instructional time was not affected because Ben Davis was already operating on an extended-day schedule. The only caveats from the superintendent were to ensure that the initiative was well organized and that it resulted in raising student achievement.

In fall 2004, an action committee was formed to study the formation and implementation of Late-Start Mondays. The committee comprised a cross section of high school personnel and community members. Creating Late-Start

Mondays was risky because it had far-reaching ramifications for internal and external audiences. For the internal audience of teachers, it meant a change in "how we do business around here"—how work would be organized, how learning would occur, what would be learned, how one's knowledge base and belief system might be challenged by others, and how some teachers would be thrust into new and perhaps uncharted leadership roles. For the principal, it meant sharing power, defining new boundaries and cultural expectations, forging and sustaining a focus on student learning and problems of practice, championing the cause, and negotiating and confronting opposition (Hord and Sommers 2008; Wagner and Kegan 2006). For the central office, it required locating new resources, removing barriers to implementation, supplying teachers with timely student learning data, and possibly reassigning personnel and/or hiring consultants to support professional development. For external audiences, primarily parents, it meant a change in schedule with possible transportation and work implications and evaluating the educational merit of this change. For the action committee, it required mustering the political will and skill to sell the idea to teachers and community members, the foresight to make smart moves, and the logic to organize the initiative in an efficacious manner. Most, if not all, of these issues confront any systemic change and restructuring initiative. The committee guided their initial actions with the following questions:

- What would late-start look like?
- How does it fit into the daily and weekly schedule?
- What would teachers accomplish?
- How do we provide accountability?
- What arrangements would be needed for bus schedules?

The school already had a strong spirit of cooperation with the central office, but the leadership team knew they needed to develop buy-in with other stakeholders, especially parents and teachers, and thus they held two community forums in spring 2005. At the forums they presented the rationale for late-start and the potential benefit to students, and they addressed questions carefully. The stakeholders unanimously endorsed the idea, and the initiative was to be launched in the fall. The administrators and instructional coach were not totally surprised at the ease of this acceptance, because both Ben Davis and the MSD of Wayne Township have a strong track record of reaching out and partnering with their community and stakeholders.

Given the green light, the high school leadership team worked through the summer to plan how they would use the shared learning time. They determined that the 75 minutes each Monday morning would be committed to creating opportunities for teachers to meet and collaborate and to engage in meaningful

conversations. In general, the shared time would be devoted to department and team meetings, professional development, course meetings, common assessment development and analysis, and occasional staff meetings. They knew that professional development would drive change and that these sessions needed to be the focal point. They decided that professional development sessions would occur once per month and involve the entire faculty. To consolidate and manage planning, an instructional coach and assistant principal took charge of the Late-Start Mondays initiative. Table 2.1 provides a Late-Start Mondays schedule showing the various kinds of meetings.

The leadership team saw the role of formal professional development as the linchpin of success for Late-Start Mondays. Their foresight now comports with current literature in that one of the lessons learned in whole-school change is the need for school leaders to determine and guide the professional development in order for it to be anchored in raising student achievement and changing teacher practice (National Association of Secondary School Principals 2004). Therefore, the selection of topics must be intentional and mindful of the ultimate outcome—increasing student learning through effective instruction. Moreover, in order to disrupt the status quo, professional development must be simultaneously functional and transformational—that is, it must connect with classroom practice, provoke reflection on beliefs about learning and practice, embody the principles of change theory, and be in force over time.

The literature indicates that "deep change occurs only when beliefs are restructured through new understandings and experimentation with new behaviors" (Loucks-Horsley et al. 2003, p. 49). This quote points out the critical need for teachers to be able to take what they have learned from professional development and employ it in a psychologically safe environment where progress is measured incrementally and social support is provided for the construction of new meaning. On his website, Wenger speaks to this need for deep change when he states that "in the education sector, learning is not only a means to an end: it [is] the end product. The perspective of communities of practice is therefore also relevant at this level. In business, focusing on communities of practice adds a layer of complexity to the organization, but it does not fundamentally change what the business is about. In schools, changing the learning theory is a much deeper transformation." A PLC needs time to transform thinking and actions.

The Late-Start Mondays team decided early on that teachers would lead and facilitate the professional development. The instructional coach remarked that "teachers want to be taught by other teachers." The planning team made that principle a reality and took the initiative to recruit and "grow" teacher leaders in the building. These teachers represented the various content areas and received no other compensation than the opportunity to work with their colleagues. The decision to endorse teachers first and foremost as strand leaders comports with Wenger's ideal

Table 2.1. Late-Start Mondays Schedule of Meetings

August 20	Faculty meeting	January 7	Faculty meeting
August 27	Department meetings	January 14	Department meetings
		January 28	Course meetings
September 10	Course meetings		
September 17	Graduation exam meeting (GQE)	February 4	Shared learning
September 24	Shared learning	February 11	Department meetings
		February 25	Course meetings
October 1	Department meetings		
October 8	Course meetings	March 3	Department meetings, GQE
October 15	Shared learning	March 10	Course meetings
October 22	Department meetings	March 17	Shared learning
October 29	Course meetings	March 24	Department meetings
November 5	Shared learning	April 7	Course meetings
November 12	Department meetings	April 14	Shared learning
November 19	Course meetings	April 21	Department meetings
November 26	Shared learning	April 28	Course meetings
December 3	Department meetings	May 5	Shared learning
December 10	Course meetings	May 12	Share Fair—celebration
December 17	Faculty meeting	May 19	Faculty meeting

Department meetings are designed for entire departments to collaborate and share on the following topics: common assessments and collection of data, failure rates and interventions, use of reading strategies, curriculum mapping, engagement strategies, etc. *Course meetings* are designed for teachers of common courses to collaborate on the following topics: common assessments and inferences from data, intervention strategies, implementation of reading strategies, creation of core academic vocabulary activities and games, unwrapping the standards, etc. *Shared learning* meetings are designed for teachers to learn, practice, and share the successes and struggles of the current professional development.

of how a community of practice should function. On his website, Wenger states that "members of a community of practice are practitioners. They develop a shared repertoire of resources: experiences, stories, tools, ways of addressing recurring problems—in short a shared practice. This takes time and sustained interaction." A teacher can naturally address this peer-to-peer professional development process and translate the professional development content into applied practice.

Teacher leaders were supported in their new role by attending professional development institutes on effective instructional frameworks and strategies for improving student learning and then engaging other teachers in learning about them through the Monday-morning sessions. The teacher leaders were also supported with help from a consultant from a local university and district instructional coaches. To date, teacher leaders or strand leaders who are responsible for leading sessions during the shared learning time commit to being absent from their classrooms one day per month: a half-day to meet with the consultant and another half-day to meet with the instructional coach in order to prepare for the Monday-morning professional development sessions. The administration covers the classes with substitutes but staggers the periods so that the teachers do not repeatedly miss the same class. To bring other teachers into the fold, teacher leaders rotate on a periodic basis. This strategy works as a mechanism to build capacity throughout the school by including teachers in different content areas and departments.

Teachers choose areas of focus for their professional learning and attend multiple sessions on the same topic each semester in order to develop deep understanding. Each session progressively deepens the teacher's knowledge base and level of application. Such sophistication is necessary because the teachers are committed to exploring the various strategies learned through the professional development and expected to collaborate with other teachers, develop and implement lessons, and meet with department colleagues to share lessons and products. Some of the session topics for the last four years are listed in Table 2.2.

This first year of the schoolwide Late-Start Mondays needed to see a bright light of success and excite teachers about learning and trying new ideas in their classrooms. The effort also needed to promote the benefit of collaboration and having sustained conversations about teaching and learning, which could translate into student achievement. To manage the cultural impact, Late-Start Mondays for the first two years were mandatory—teachers had to sign attendance rosters and provide written feedback. An administrator was assigned to each session to ensure appropriate oversight and to be a part of the process. This strategy may appear heavy-handed, but it was a signal to the existing culture that "the way we do business around here" was changing. According to Schein (2008), establishing a learning culture requires intentional acts of leadership. He stated that "it can be argued that the only thing of real importance that leaders do is create and manage culture" (p. 362). At this early stage of implementation, school leaders needed to

Table 2.2. Shared Learning Topics for Late-Start Mondays

Academic Year	Shared Learning Topics (teachers select one)
2005–2006	Building a Positive Learning Environment Graphing Calculators 6+1 Writing Traits Reading for the Struggling Learner Strategies for Struggling Learners Beyond Reading Writing is a Process Cultural Competency 7 Keys to Reading Comprehension
2006–2007	Visualization Making Connections Determining Most Important Information Summarize and Synthesize Asking Questions Making Inferences Setting a Purpose Monitor and Clarify
2007–2008	Implementation of Reading Comprehension Strategies From 2006–2007
2008–2009	Literacy for New Teachers Beginning With the End in Mind (unit plans) Project-Based Learning

demonstrate that they were making a serious investment in establishing a learning organization with accountability and were willing to assume the responsibility for managing it to fruition.

In addition to professional development sessions, the 75 minutes on Monday were also used to provide time for departments to develop and refine common assessments, to analyze student learning based on these assessments, and to determine interventions for students who were receiving a failing grade. Ben Davis had been tracking the failure rate of students for over a year and intervening with a number of effective strategies (Reeves 2006). In 2007, the principal challenged the departments to take a closer look at the failure rate, discuss current interventions, and develop some new ideas. The results were quite impressive. The schoolwide failure rate decreased from 16% in spring 2006 to 6.5% in 2007–2008. According to teachers and administrators, some of this reduction can be traced back to focused conversations regarding individual students during the shared learning time and the prevalent use of literacy strategies. The Science Department in particular realized a decrease in the failure rate from 9.7% in 2006–2007 to 7% in 2007–2008. That decrease affected about 170 students, which means that these students turned failure into success.

Wagner and Kegan (2006) identified the seven disciplines for strengthening instruction—the first one is "urgency for instructional improvement using real data"

(p. 27). They noted schools that often generate too much data, which can overwhelm teachers; it might be better to use a single point of data such as the failure rate to send a powerful message. In the case of Ben Davis, their focus on one set of data as an indicator of success certainly proved to be a powerful message. Teacher discussions on Monday mornings were instrumental in keeping the focus on student learning and challenging teachers to turn student failure into student success.

A challenge to any PLC is the acculturation of new teachers in its attendant goals, beliefs, and practices. The current principal of Ben Davis remarked that they try hard to retain teachers so that they do not lose momentum, but a mechanism must exist to induct new teachers into the learning culture. Ben Davis had 32 new teachers at the start of the 2008–2009 school year, which illustrates this challenge. The principal added that they must differentiate their support for new teachers to help them become a part of the culture. Two teachers from chemistry and life science who have served as strand leaders for three years echoed the principal's point. They noted that they must work very diligently and deliberately with first-year and new teachers to challenge them to think about how to work with each other. The teachers stated that collaboration does not come naturally and the expectation to engage in dynamic conversations about teaching and learning requires risk taking, trust, and knowledge of the culture. Therefore, first-year and new teachers face a steep "change curve." In addition, the strand leaders pointed out that first-year teachers in particular have difficulty determining what information is most important to use in lesson planning, let alone deciding how to use the strategies to motivate students and optimize their learning.

Given the issues of acculturation and differentiating support, the Monday-morning collaboration time now consists of three levels. Level 1 is for first- and second-year teachers, who receive professional development in the basic literacy framework and strategies. Such strategies include how to increase reading comprehension, build and strengthen core academic vocabulary, and enhance writing fluency and thinking skills. Level 2 is for teachers who choose to revisit or explore further unit and lesson design. These teachers may decide to refine and practice the use of specific instructional strategies such as how to better activate and build background student knowledge. Level 3 is for experienced teachers who have been immersed in the PLC and want to move into new areas. The principal referred to this last phase as deep implementation—that is, teachers taking ownership of their own learning. For 2008–2009, the new area is project-based learning (PBL).

The Buck Institute for Education (2003) defines PBL as "a systematic teaching method that engages students in learning knowledge and skills through an extended inquiry process structured around complex, authentic questions and carefully designed products and tasks" (p. 4). The push for PBL grew from some of the nascent cross-curricular projects that involved several science teachers and

other content areas such as English and building trades. About 90 teachers are currently involved in PBL activities. The teachers are free to choose partners, but they must declare the topic of their PBL and commit to creating a unit. Some of the projects that involve science teachers include "Alternative Fuels," in which students will create a bio-diesel engine; "Energy Transfer of the Human Body"; "How Can Understanding Chemistry Help You Improve the Water That You Use?"; and "Concrete and Chemistry."

Hord and Sommers (2008) addressed the need for teachers to share personal practice through classroom visits, observations, providing feedback, and interacting with each other around a common instructional practice. Such personal involvement builds positive relationships, which engender trust, collegiality, and sharing. Although the PLC at Ben Davis has not yet taken this personal path, they did create a whole-school experience in which teachers showcased their accomplishments. In spring 2008, the departments celebrated the professional development initiatives that they had been working on over the year by putting on a Share Fair. Each department made tri-fold boards and presented examples from their work. The boards included lesson plans, student work, pictures, and student data. Boards were exhibited in the school gymnasium, and faculty were given time to visit each other's displays. The leadership team felt that the Share Fair was a way to honor and celebrate the hard work that teachers had been doing. One of the life science teachers pointed out that "so many teachers around here are doing so many wonderful things and they have a lot to share."

Science Initiatives

The Science Department has a strong departmental PLC, but it has become more robust as a result of the conversations and shared learning time in Late-Start Mondays. A chemistry teacher remarked that "Monday mornings have influenced how we interact and how we purposively integrate literacy into our lessons." Within the last year, the Science Department has spearheaded several new collaborations and projects. The first one extended the PLC concept vertically by making connections with the elementary and middle school teachers.

The connection with elementary schools occurred as a result of district data indicating that students were not adequately prepared for the advanced curriculum of high school science. According to the district coordinator for math and science, students in grades 3–8 needed additional assistance in meeting the standards that address inquiry as well as science concepts and processes. She saw an opportunity to build on previous connections that the high school Science Department had made with the elementary schools. As a result, the district coordinator sent a survey to all elementary and middle school teachers to identify which state science standards they would like to learn more about. The elementary teachers responded very

positively to the survey and indicated a desire to deepen their content knowledge around a number of the state standards. They also wanted ideas about how best to teach these specific standards to students through an inquiry-based approach. This information was shared with the high school teachers, and they each selected a topic of focus for their work. They reviewed the district science curriculum guide and put together several inquiry-based lessons using hands-on activities that could be implemented in the elementary classroom.

In order to share these lessons and activities and additional topics relevant to the science curriculum, the high school science teachers organized a Teacher-to-Teacher Conference in March 2008 for K–8 teachers. The workshop topics included "Genetics Made Easy and DNA Extraction," "Magnetism and Electromagnetism," and "Vibrations, Waves, and Sound."' The high school teachers expressed their excitement and desire to promote science instruction at the elementary level. Building on this momentum, the high school science teachers held an additional Share Fair for fourth-grade students from a local elementary school by having Advanced Placement students present for 10 minutes on a host of subjects (e.g., sharks, chemical reactions, elements and compounds, polymers, and phases of the moon). This fair served as another avenue to interest elementary students in science and to promote more vertical connections. The high school science teachers and the elementary teachers enjoyed partnering with each other to strengthen their students' science content knowledge.

For 2008–2009, the district has formalized four after-school sessions for high school science teachers and fifth- and sixth-grade teachers to engage in workshops, and one additional session to continue discussion about curriculum articulation. The central office administrator for math and science commented that the elementary teachers really enjoyed coming over to the high school to engage with the high school teachers. Obviously, the notion of an open community of learning permeates the district, and the willingness of the high school teachers to share their expertise makes this interaction a win-win situation, especially for students.

Another very interesting and innovative project took place in spring 2008. The genesis of this project grew out of the Monday-morning conversations and sessions. One morning the Integrated Chemistry/Physics (ICP) teachers were talking about how to help their students make connections and engage with the content. A building trades teacher overheard the conversation and interjected that perhaps some real-world connections might help. This conversation led the ICP and building trades teachers to sit down, compare each subject's state curriculum and standards, and look for overlaps. They wanted to see how they could create interdisciplinary lessons, bring more relevance to ICP students, and explore the possibility of awarding science credits through the building trades classes since the departments share some of the same students. Because of the need to ensure that state science standards would be met through the building trades curriculum, the

last idea is still percolating. However, these conversations paid big dividends and led to the development of a PBL unit on electricity in the ICP classes entitled "The Household Wiring Unit." The building trades teacher worked with the ICP teachers on the practical aspects of household wiring and built stud walls in the ICP lab. The ICP teachers visited the house under construction by the building trades students to better understand the electrical and wiring process. Additionally, the ICP teachers spoke with the local power company to understand the process by which electricity is generated so they could convey this information to students. Students were challenged to take what they had learned about electricity in the ICP class and apply it by wiring a stud wall with a functional switch and socket. Specifically, the students had to develop a circuit, identify electrical devices, use materials and tools, and explain the flow of current in the circuit. The video of the unit showed a high degree of student engagement, learning, and enthusiasm. One of the ICP teachers remarked that the students certainly showed more effort and were quite willing to accept the challenge. She also commented that "returning to traditional instruction seemed so odd given the success of the applied unit." The building trades teacher exclaimed that the dual lesson was a "big win" and added that he only affects about 80 students a year in the Career Center, but now he had affected 800 students in ICP.

Another collaboration between the building trades and ICP teachers centered on the construction of mousetrap cars. Constructing mousetrap cars is a common activity in middle and high school classes to address national and state science standards associated with Newton's law, energy, acceleration, friction, and force (see Indiana's Academic Standards for Principles of Integrated Chemistry-Physics CP.1.20-1.23 at *www.indianastandards.org/standard.asp?Subject=sci&Grade=CP&Standard=1*). The scenario at the beginning of the chapter occurred when the teachers were deciding how to approach this unit and build interdisciplinary content. The ICP teachers remarked that they could buy mousetrap car kits but did not want to do that. Instead, they teamed up with building trades teachers. An interesting development in this shared unit was how the teachers integrated writing. They decided that the students would supply some of the materials for the cars, such as axles. To obtain the necessary materials, the ICP students were required to submit a written requisition form. This form would contain all of the data needed to fulfill the order, such as the length of the axles. If the form was not legible or understandable, the form would be returned to the sender for clarification. This requirement illustrates the infusion of literacy into shared projects and how Ben Davis teachers strive to enact the professional development initiative.

The diffusion effect of Late-Start Mondays is emerging in the linkages between the Science Department and other content areas. Currently, English and science teachers have teamed up on a project-based unit, with more cross-curricular projects in the works. The exciting part of the Ben Davis story is not only what it has accomplished in a brief period of time, but also what the future holds for continued collaboration and creativity.

Chapter 2

Lessons Learned

Reflecting on the process by which Ben Davis High School implemented its PLC yields some important insights. Foremost, change was driven through a top-down, bottom-up leadership process. School administration set the structure and institutionalized time in the school schedule for teacher learning. They outlined the expectations, but teachers led the professional development. This joint action by teachers and administrators not only was an effective strategy to achieve buy-in and accountability but also sent a powerful message of unity and commitment. Securing the support of external and internal constituents increased the supportive conditions necessary to launch the change effort. Such support reduces potential conflict and keeps the energy level high as the team builds the organizational infrastructure. Ben Davis also decided to take the PLC schoolwide, instead of by grade level or department, thus creating a culture of practice that cut across all content areas. This strategy provided opportunities for cross-curricular collaboration and assisted in reducing isolation. The Late-Start Mondays team employed a professional development theme of literacy strategies, which could be universally applied across content areas and result in increased student engagement, learning, and thinking. It also served as the catalyst for cross-departmental collaboration among teachers, further contributing to the schoolwide changes in culture. The school also found a way to celebrate their achievements by implementing low-cost Share Fairs, which gave all teachers an opportunity to showcase their hard work and results.

In most change efforts there are varying degrees of resistance and reasons for such opposition. In the case of Ben Davis, there was noted reluctance to engage in implementing professional development initiatives in the elective classes such as family and consumer sciences, physical education, music, and technology education. Most of these classes are performance-based classes, and these teachers did not understand how to apply the instructional strategies to their classrooms. All of the examples given in the professional development sessions were academic examples, and, until teacher leaders and administrators realized that they needed to sit down and talk with some of these elective teachers to help them with the connections, the teachers struggled. After the teacher leaders and administrators recognized this issue and provided feedback and the freedom to be creative with the strategies, in addition to more time to figure out how to fit the strategies into their curricula, these teachers became less resistant.

Another issue that sheds light on how PLCs evolve is the range of implementation of practice among the faculty. During the first year of the PLC at Ben Davis, the range of implementation was quite uneven, but subsequently more teachers in more content areas have come on board and endorsed the intent of the community to collaborate, de-privatize their teaching, and infuse their practice with a host of

student-centered strategies. In addition, many teachers at Ben Davis have started to find others who share passions and ambitions in certain areas of the professional development (for example, PBL) and have forged ahead with their own additional learning. The PLC needs to provide flexibility for teachers at all levels of experience to identify their needs and personalize their learning.

A final lesson learned is the ongoing challenge to find ways to document continuous improvement and the success of the PLC toward its ultimate outcome—student learning. To be frank, Ben Davis continues to struggle with how to collect data to look at the success of its Late-Start Mondays. They continue to conduct staff and student surveys, experiment with walk-through data collection protocols, and use Literacy Audits to document strategy implementation data. True success will be seen in student achievement indices such as graduation rates, standardized test scores, student attendance records, and failure rates.

Based on the experiences at Ben Davis, if you are starting the PLC journey in your own context, here are some recommendations to keep in mind and some potential pitfalls to consider:

- Create a small leadership team with the authority to plan and coordinate the PLC goals, structure, calendar, and professional development. Include the person in charge of the master schedule on this team to plan and negotiate calendar challenges.
- Spend the time and money to develop teacher leaders and do so a year in advance of starting to implement changes in the school. Use your academic coaches to assist in this process.
- Build in time for continued professional development and learning throughout the school year. Make a commitment to establish protected time each week for teacher and team collaboration.
- Establish a system of accountability, and make expectations realistic and explicit. Monitoring attendance at PLC meetings sends a powerful message to the culture.
- Create time and structures that enable teachers to see each other in action in their classrooms. Provide teachers with opportunities to learn the skills and strategies for interactive dialogue and self-reflection.
- Plan well! Plan the first year in detail, with an outline of the next two to three years so that teachers and leaders know where they are headed.
- Start small and take baby steps toward achieving your vision.
- Build in time to celebrate success.
- Be sure to have flexibility in place, and be sure your plan has room for growth. From year to year, teachers will learn at different rates, and some teachers may need longer to implement strategies whereas others may

master them quickly and need additional learning. In addition, make sure to plan for teachers who are new to the school. Ben Davis has hired more than 30 teachers over the last two years, and each needed his or her own opportunities to learn from the beginning.

- It is easy to share the successes, but don't be afraid to talk about the frustrations and struggles that are experienced. Sometimes the best way to move forward is to allow time to share frustrations and to find collaborative solutions.

Intended and Unintended Consequences

As Margaret Wheatley (2002) reminded us, conversation is powerful. As the authors were interviewing teachers and administrators, the word *conversation* kept coming up. Monday mornings were repeatedly referred to as the "time when we have conversations about teaching and learning." The teachers and administrators have capitalized on the power and courage of conversation to build a learning culture in their building. Sawyer (2007) contended that the genius of collaboration resides within the group and creativity is unleashed through the act of improvisation. He observed that "in both an improv group and a successful work team, the members play off one another, each person's contributions providing the spark for the next. Together, the improvisational team creates a novel, emergent product" (p. 14). The teachers, strand leaders, and administrators at Ben Davis showed the interplay of working as an improv team where ideas bounce off one another, creating breakthrough thinking, new designs, and interdisciplinary projects. That feeling was present during the interviews, watching the videos of PBL teams, and listening to the ICP and building trades teachers discuss the unit on mousetrap cars. If improvisation is the mark of a high-performing PLC, Ben Davis High School certainly embodies that distinction.

Reflection Questions

- What is your rationale for considering a PLC? What are the costs and benefits to teachers, students, and stakeholders?
- What variables in your context must be considered in order to plan and initiate a schoolwide PLC?
- How can leadership build on existing organizational strengths to effect change and build a community of practice?
- What internal and external resources are available to assist in planning and supporting schoolwide changes and initiatives?
- What district and school structures will support or hamper effective implementation of a PLC?
- What is the role of the central office in planning and supporting a PLC?

- How can resources be aligned across the school and district to support a PLC?
- Who are the potential teacher leaders and what is their level of expertise to initiate and sustain a PLC?
- What are your critical indicators of progress and success?

References

Buck Institute For Education. 2003. *Project based learning handbook: A guide to standards-focused project based learning for middle and high school teachers.* 2nd ed. Hong Kong: Quinn Essentials Books and Printing.

DuFour, R. 2004. What is a "professional learning community"? *Educational Leadership* 61 (8): 6–11.

Hord, S. M., and W. A. Sommers. 2008. *Leading professional learning communities: Voices from research and practice.* Thousand Oaks, CA: Corwin Press.

Indiana Department of Education. Indiana academic standards and resources. *www.indianastandards.org*

Loucks-Horsley, S., N. Love, K. E. Stiles, S. Mundry, and P. Hewson. 2003. *Designing professional development for teachers of science and mathematics.* 2nd ed. Thousand Oaks, CA: Corwin Press.

National Association of Secondary School Principals. 2004. *Breaking ranks II: Strategies for leading high school reform.* Reston, VA: National Association of Secondary School Principals.

Palmer, P. 1998. *The courage to teach.* San Francisco: Jossey-Bass.

Reeves, D. 2006. Leading to change: Preventing 1,000 failures. *Educational Leadership* 64 (3): 88–89.

Sawyer, K. 2007. *Group genius: The creative power of collaboration.* Cambridge, MA: Basic Books.

Schein, E. 2008. Creating and managing culture: The essence of leadership. In *Business Leadership: A Jossey-Bass Reader*, 2nd ed., ed. J. Gallos, 362–369. San Francisco: John Wiley and Sons.

Wagner, T., and R. Kegan. 2006. *Change leadership: A practical guide to transforming our schools.* San Francisco: Jossey-Bass.

Wenger, E. n.d. Communities of practice: A brief introduction. *www.ewenger.com/theory/index.htm*

Wheatley, M. 2002. *Turning to one another: Simple conversations to restore hope to the future.* San Francisco: Berrett-Koehler.

Index

Index

Index

Index