

Practices Worthy of Attention
Common Vision for Mathematics Success
Phoenix Union High School District
Phoenix, Arizona

Summary of the Practice. Phoenix Union High School District’s mathematics leaders decided to use professional learning communities to standardize the way teachers were engaging with students. Since the majority of students were not successful in mathematics, teachers in Phoenix Union began to work together to change the culture of practice by opening their doors to peer review and learning from one another about best strategies for improving student learning in mathematics.

Need. Most students in secondary mathematics in Phoenix Union were not passing the state’s large-scale standardized exam in mathematics (only 17% and 21% were passing in eighth grade and tenth grade, respectively). Teachers needed new strategies for engaging students and teaching mathematics.

Goal. The goal of Phoenix Union’s practice is to improve the quality and consistency of mathematics teaching across the district through regular teacher meetings to discuss concerns, challenges, and instructional practices. Through these meetings, teachers realize that they are accountable for student learning and that they need to change their practice to engage more students, which would then translate into improved student learning and performance in mathematics.

Demographics

Phoenix Union High School District in Arizona serves grades 9–12. Enrollment has remained fairly consistent over the last four years, averaging about 24,000 students (see Table 1).

Demographic data for Phoenix Union were available only for 2005–2006, during which approximately 91% of the district’s students were racial or ethnic minorities: 75.7% were Hispanic, 10% black, 3.6% Native American, and 1.4% Asian American. In addition, 75% of students were classified as economically disadvantaged and 21.6% as having limited proficiency in English.

Table 1. Phoenix Union High School District Enrollment Data

Academic Year	Enrollment
2002–2003	23,644
2003–2004	23,989
2004–2005	22,179
2005–2006	24,474

Table 2 lists the graduation and dropout rates over the past few years for Phoenix Union; the district did not provide demographic data for these two categories. Graduation rates have improved slowly but steadily and dropout rates have decreased.

Table 2. Phoenix Union High School District Graduation and Dropout Rates

Academic Year	Percentage Graduating	Percentage Dropping Out
2002–2003	68.1	8.5
2003–2004	70.5	6.1
2004–2005	72.6	5.4
2005–2006	72.0	5.1

Description of the Practice

At the end of 2002–2003, only 17% of eighth-grade students and 21% of tenth-grade students were passing the mathematics portion of the Arizona Instrument to Measure Standards (AIMS), Arizona’s standards-based test that satisfies requirements of the No Child Left Behind Act. Teachers and administrators were extremely frustrated, as they were working hard to improve student learning but were failing to see positive results. They decided to focus on ensuring student success in Algebra I, which they saw as an important entry point for students to access higher-level mathematics.

In summer 2003, Phoenix Union began developing professional learning communities (PLCs) for teachers. The creation of PLCs resulted in some differences in teachers’ thinking and approaches to instruction. The district based the PLCs on the philosophy that all students can learn, and within the PLCs, they created a culture of caring, refocusing teachers’ attention from frustration to a belief in students’ ability to succeed if the students were given the right opportunities to learn. Every teacher took responsibility for students’ growth by making changes to their own practice to accommodate their students, rather than keeping their previous approach, in which they consciously or unconsciously thought that students should adjust to their teaching style.

This change was reflected in the classrooms, where teachers would say to students, “We will not give up on you even if you give up on yourself.” Teachers continually told students, “You can do it.” These practices fell in line with the district mission, which is “to provide a learning environment that enables every student to develop those understandings, attitudes, and skills needed for success.”

This shift in thinking focused Phoenix Union’s teachers on the needs of a diverse student population. Studies show that students who are ethnic minorities sometimes come into new situations feeling socially isolated and needing a strong network to keep them academically engaged (Bozeman, 1989; Manis, Thomas, Sloat, & Davis, 1991; Matayas & Malcom, 1989). When teachers know this, they can more accurately adjust their instruction and help build support systems that can provide the encouragement and the networks students need, which

results in improved student attitudes toward school as they begin to believe in their own success.

Once the common vision of teaching took hold, teachers would work in the PLCs to address the logistical steps of improving student learning in mathematics. Teachers looked to the National Council of Teachers of Mathematics (2000) equity principle as a focus point, making concrete steps to achieve that goal:

Excellence in mathematics education requires equity—high expectations and strong support for all students. . . . All students, regardless of their personal characteristics, backgrounds, or physical challenges, must have opportunities to study—and support to learn—mathematics. This does not mean that every student should be treated the same. But all students need access each year they are in school to a coherent, challenging mathematics curriculum that is taught by competent and well-supported mathematics teachers. (p. 12)

The district's strategies for improving mathematics achievement included creating a culture of high expectations for congruence in instruction and assessment, removing barriers of access to the core academic curriculum, and requiring variable amounts of time for intervention and support.

In the first strategy—creating a culture of high expectations for congruence in instruction and assessment—teachers enforced high standards of learning, keeping in mind NCTM's equity principle. In mathematics, this meant moving more students into Algebra I earlier, while also offering them the academic support they needed through better use of differentiated instruction. Teachers also spent time discussing “effort-based ability” with students, indicating that intelligence is acquired through working hard (see, for example, Saphier, 2005). Through discussion about effort-based ability, teachers continually pushed students to work harder while also giving them the academic support they needed. Students realized that, with the help of teachers who supported them, they could be responsible for their own learning. The support network for students was established so that they felt that learning and working hard was a safe experience, because their teachers were there to help them succeed and to make sure they would not fail.

In the second strategy—removing barriers of access to the core academic curriculum—the main barrier involved teachers working alone, not knowing what colleagues did in individual classrooms. Part of being in the PLCs meant that teachers opened their doors to each other, so no teacher worked in isolation. Teachers began to change their thinking about classroom observers, no longer assuming they were evaluative and critical; instead, teachers learned ways of improving their practice through observation of their peers. They began to share what worked well and went to one another for help when they struggled with a concept or topic. These changes resulted in more consistent instruction and assessment strategies across the district.

In addition, the district began having teachers use some advice from Darling-Hammond, Aness, and Ort (2002) to improve students' access to the curriculum, which included (a) providing real-life applications and thus meaning and context to the mathematics,

(b) making all student work public to show off their accomplishments and to know what students really do know or are struggling with, and (c) developing teacher teams to provide meaningful lessons and assessments that are congruent with the course material and standards being taught. Although all of these methods were discussed in teacher preservice and inservice workshops, many teachers did not know how to incorporate the methods in their classrooms. The PLCs offered a forum where teachers could talk about specific examples, resources, and strategies for putting these ideas into practice.

The third strategy—requiring variable amounts of time for intervention and support—meant that teachers learned to create variable time to support students within the regular school day for students to get their work done. By redefining how time in school was used to intervene and support students in completing their homework, teachers made sure that students had time to complete assignments and were there to help them when they had trouble with the assignments. Teachers also learned how to use small student learning groups and encourage collaborative learning, where peers could help one another.

Results

Phoenix Union High School District is measuring improvement in several ways, mainly centered around students' test scores, and grades in Algebra I classes. Table 3 lists Phoenix Union's results for the past few years on the mathematics portion of the Arizona Instrument to Measure Standards (AIMS).

The district has made considerable and steady gains in high school students' mathematics performance for all students as well as across subgroups. The testing results for 2004–2005 across grades and subgroups are anomalous compared to the previous years and to the 2005–2006 results. Even ignoring that anomalous increase, it appears that the percentage of all students meeting or exceeding the state standards has increased significantly, from 21% for tenth-graders in 2002–2003 (before use of the PLCs) to 50% for tenth-graders after three years of PLCs.

Similarly, in eleventh and twelfth grades, the percentage of all students meeting or exceeding the state standards increased, with the percentage of eleventh-graders passing going from 20% in 2002–2003 to 31% in 2005–2006, and from 12% to 29% for twelfth-graders over the same time span. In fact, increases in student performance can be seen across all subgroups. In particular, performance for Hispanic students went from 17% in 2002–2003 to 47% in 2005–2006 on the tenth-grade AIMS, 17% to 31% on the eleventh-grade AIMS, and 10% to 28% on the twelfth-grade AIMS.

Table 3. Percentage of Phoenix Union Students Proficient on the Arizona Instrument to Measure Standards

Demographics	Academic Year	Percentage Met/Exceeded Standard		
		Grade 10	Grade 11	Grade 12
All Students	2002–2003	21	20	12
	2003–2004	21	17	13
	2004–2005	61	64	49
	2005–2006	50	31	29
Asian American	2002–2003	56	46	35
	2003–2004	50	47	*
	2004–2005	74	64	*
	2005–2006	77	30	*
Black	2002–2003	12	10	10
	2003–2004	16	20	10
	2004–2005	49	60	36
	2005–2006	42	23	29
Hispanic	2002–2003	17	17	10
	2003–2004	16	15	11
	2004–2005	60	63	*
	2005–2006	47	31	28
Native American	2002–2003	21	18	6
	2003–2004	18	22	19
	2004–2005	55	68	*
	2005–2006	54	46	25
White	2002–2003	43	39	21
	2003–2004	44	28	23
	2004–2005	79	70	38
	2005–2006	67	45	37

Note: The asterisk (*) notes that data were not available.

All ten comprehensive high schools in Phoenix Union are improving in Arizona’s accountability system, Arizona Learns. Arizona Learns evaluates schools based on their AIMS results and their graduation and dropout rates. In 2002, seven of the ten schools in Phoenix Union were considered “underperforming,” because they did not have the minimum required percentage of students classified as proficient on AIMS. Starting in 2003, all ten schools were in the “performing” category, which is a minimum percentage of students classified as proficient on AIMS, and held that status until 2006, when all ten schools were classified as “performing plus,” which means they were just shy of the “highly performing” category because they did not have a high enough percentage of students who were classified as “exceeding” standards on AIMS.

Phoenix Union has also studied their students' performance in Algebra I classes, since those classes have been the focus of their reform efforts. The percentage of students receiving grades of D or F in Algebra I decreased from 59% in 2002–2003 to 40% in 2004–2005. This occurred even as the number of students in high school Algebra I increased, from 3,279 students in 2002–2003 to 5,609 students in 2004–2005. The increase in the number of students taking Algebra I was not the result of placing students in slower (e.g., two-year) courses, but an increase in the percentage of students actually taking the district's regular Algebra I courses.

Conclusions

The use of PLCs in creating a common vision and set of concrete strategies in Phoenix Union has been related to large gains in student growth in mathematics, specifically in Algebra I courses. Phoenix Union attributes the improvement in test scores to the district's common vision that all students could learn and their methodical steps for ensuring that all students *would* learn. The PLCs have helped teachers share what they know and build consistent instructional practices. Another key factor has been having an open-door policy, where teachers are no longer isolated in their classrooms, but instead consistently interact and learn from one another as part of their professional development practice. Strong school and district leadership has helped build the common district vision of student ability. For Phoenix Union, the district-coordinated efforts appear to be enough to start a shift in raising student achievement.

References

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About *Practices Worthy of Attention: Local Innovations in Strengthening Secondary Mathematics*

Practices Worthy of Attention is a joint initiative of Achieve, Inc. (www.achieve.org), and the Charles A. Dana Center at The University of Texas at Austin (www.utdanacenter.org). The initiative is led by Pamela L. Paek, a research associate at the Dana Center, who, in 2006, examined 22 program, school, and district practices that showed promise—based on early evidence and observation—of strengthening secondary mathematics teaching and learning.

Our goal was to document practitioners' descriptions of *what is really happening* in the field to strengthen secondary mathematics education around the country. Thus, while the practice highlighted may be common, the specific structures and strategies used to implement the practice are worthy of attention. These initial investigations set out to mark these practices for future rigorous scientific inquiry by Dana Center and other researchers.

Ultimately, we hope to create a community of inquiry made up of university researchers working with administrators and teachers from featured schools and districts to more rigorously research how effectively these practices improve secondary mathematics learning for all students.

Reports and practice profiles. An executive summary details the methods for this initiative and analyzes themes. Two cross-case analyses discuss specific strategies for raising student achievement and building teacher capacity. Brief profiles describe each practice. All of these publications are available on our website at www.utdanacenter.org.

Data. In all cases, data about the practice were provided by the program, school, or district studied as part of a description of their practice. We did not independently analyze data gathered through a consistent assessment tool, and we did not evaluate their uses of data for measuring effectiveness. Thus, the data in the practice profiles are intended not to prove the practice's effectiveness from a research perspective, but to paint a detailed picture of the practice and what data were used by the program, school, or district to gauge how well it was working.

Theoretical frameworks. In some cases, district staff mentioned specific literature on theory or practice that they used when they developed the practice we highlight. In those cases, we cite that literature in our discussion of the practice.

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