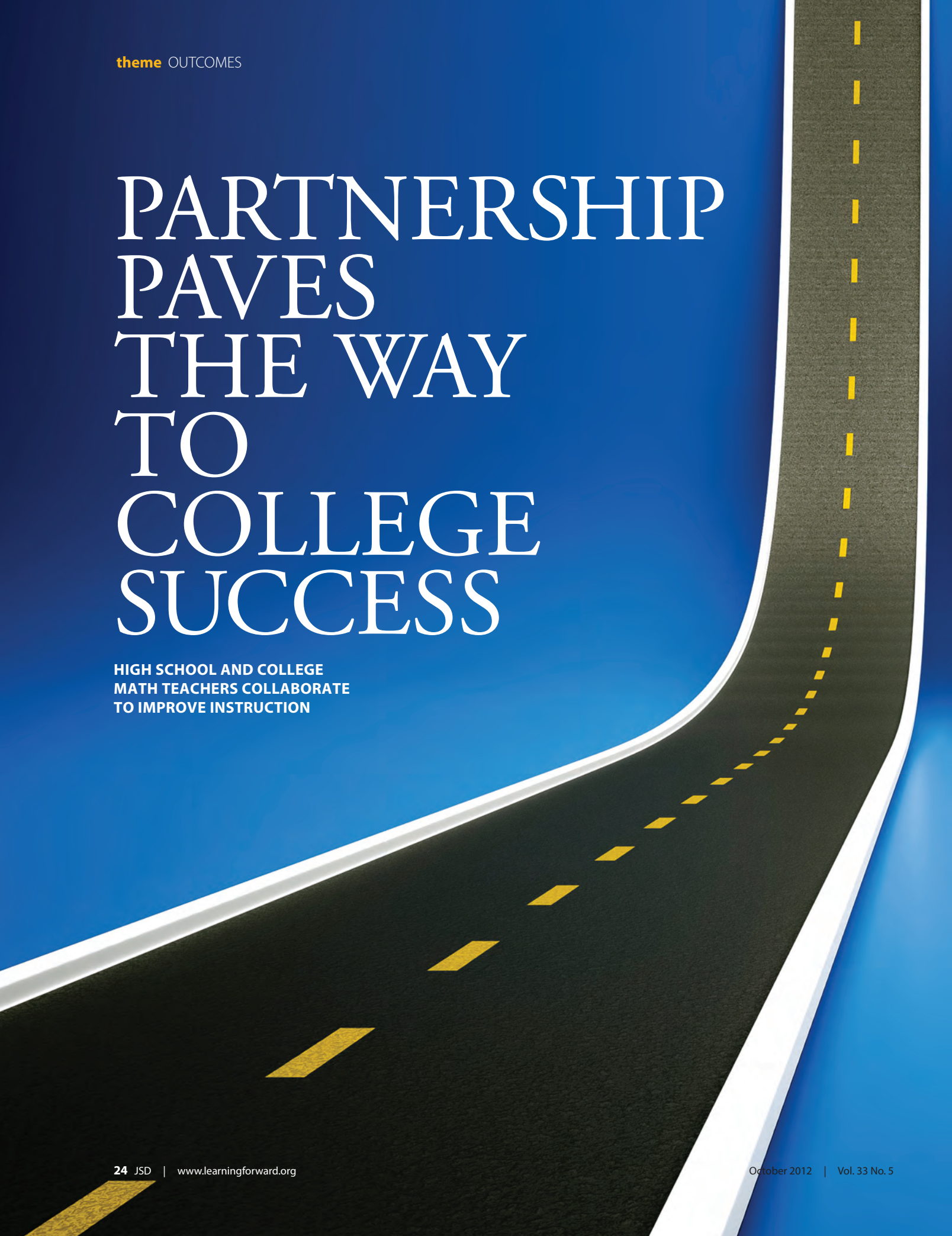
PARTNERSHIP PAVES THE WAY TO COLLEGE SUCCESS

HIGH SCHOOL AND COLLEGE MATH TEACHERS COLLABORATE TO IMPROVE INSTRUCTION



By Janet Hart Frost, Jacqueline Coomes, and Kristine Lindeblad

When high school and college mathematics teachers talk about students' difficulties in college math courses, the conversation often turns to blame: "It's your fault kids aren't coming prepared. You are watering down the curriculum." "You're not teaching them the right way." The conversation rarely turns to ways to improve student success. In Spokane, Wash., high school and college math educators have joined forces to change attitudes and teaching approaches at both levels. These changes are helping students develop the characteristics and skills they need to succeed in college.

The issue that prompted this collaboration is common across the United States. When students take college math placement tests, their scores often place them in remedial math courses that do not earn college credit. The lower students place, the less likely they are to pass these courses. In Spokane community colleges, almost half are placed in these remedial courses, and only 30% of these students earn a passing grade. If they cannot pass these courses, their options for college degrees and careers are limited.

Although earlier attempts at cross-sector collaborations in Spokane and elsewhere in Washington failed, the Riverpoint Partnership for Math and Science has succeeded. Formed in 2007, the Riverpoint Partnership for Math and Science is a group of Spokane K-12 and college administrators who came together to use their combined resources and knowledge to focus on improving student learning. With a grant from the U.S. Department of Education, the group launched the Riverpoint Advanced Mathematics Partnership project to provide professional development for high school and college math faculty. The authors of this article served as the project's planners and facilitators. Here is an overview of the project's structures and outcomes, including the context, processes, and support systems that were used to support mutual trust and respect, collaboration, and learning.

RIVERPOINT ADVANCED MATHEMATICS PARTNERSHIP PARTICIPANTS

Cohort I:

- 24 secondary participants (1 private and 7 public high schools, 2 urban/suburban school districts).
- 8 postsecondary participants (2 community colleges, 1 university).

Cohort II:

- 18 secondary participants (8 public high schools, 4 suburban/rural school districts).
- 6 postsecondary participants (1 community college, 2 universities).

KEY STRUCTURES

The project's key structures include a cross-sector learning community, common standards, an array of topics and activities related to math education (including common assessments of student work), classroom observations, and what we have labeled "little changes." All of these structures were couched within a project designed to be responsive to participants' needs and reactions.

Cross-sector learning community. The project is organized so that participants are part of the full learning community as well as smaller learning teams. Each team is

Photo by KRISTINE LINDEBLAD

Educators tackle math topics at the 2009 summer institute of the Riverpoint Advanced Mathematics Partnership. From left: Tom Skok, Jenkins High School, Chewelah, Wash.; Ruth Brocklebank, Ferris High School, Spokane, Wash.; and Ryan Seidel, East Valley High School, Spokane Valley, Wash.

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made up of high school teachers from one or two schools and one college faculty member. The community meets for five workshops each year, and teams have assignments to complete between these workshops. For example, teams conduct formative assessments of student work on common tasks and design and teach lessons together.

Teams begin by learning about each other's context and teaching approaches, and then work together in and outside of the workshops. When we observed tensions on some teams between high school and college participants, we introduced norms of collaboration (Garmston & Wellman, 2009) that focused on active listening and understanding that all members had positive intents for their work together. Because teams were doing math problems in workshops as part of their content knowledge development, they also developed norms for problem solving. For example, everyone agreed to show mutual respect for each other rather than being unintentional "math bullies" who interrupted others. In addition, we conducted frequent discussions of team assignments, readings, ideas, and challenges with the entire group.

In this larger group, we acknowledged participants' expertise and our collective responsibility for learning and developing methods of instruction that would address student learning. When individuals or teams experienced difficulty completing project work, they were asked to determine what roadblocks stood in their way and share strategies for working around these roadblocks.

Common standards. Throughout the project, participants worked with the College Readiness Mathematics Standards (Transition Mathematics Project, 2004), which were created by a statewide consortium of high school and college math educators. These standards include more than math content and processes. They also describe student attributes needed for college success, such as perseverance, attention to detail, intellectual engagement, and responsi-

bility for learning. Many participants came to believe that these attributes were the most important standards and used them as a focal point of their work in the project.

Array of topics and activities. In addition to the standards and assessments of student work on common tasks mentioned above, participants studied an array of topics such as student engagement, levels of questioning and cognitive demand, math-specific topics (e.g. math content for teaching, proofs, multiple representations), and curricular balance of problem solving, conceptual development, and procedural skill development. Teams shared the results of their assignments, and the group discussed each other's ideas for rich lessons and ways to address the common student errors discovered. As participants gained confidence about sharing ideas and concerns about their teaching, they conducted lesson studies in which one teammate taught a lesson to his or her class, observed by the rest of the team. After the lesson, the team met to critique the lesson, analyze student response, and revise it for another teammate to teach. College faculty were invited to participate in their high school teammates' lesson studies, but a few also conducted their own lesson studies.

Participants who were uncomfortable at the start sharing their ideas about teaching found these lesson studies invigorating and wanted more opportunities to do them. For example, in project evaluations, participants were asked what they might have liked to see done differently, and one responded, "First [year], lesson planning; second, lesson studies; third, more lesson study."

Classroom observations. Three times a year, we visited each high school to observe lessons taught by participating teachers. Individual and team meetings followed these observations. In individual meetings, we discussed lesson characteristics, such as levels of questions, learning targets, and student response. Team meetings focused on team assignments and collaboration. Due to restrictions in the grant, college faculty were not observed as often, but we observed and met with each faculty member at least once during the project, and they were encouraged to attend observations of their high school teammates.

Little changes. Despite their enthusiasm for the project, many participants were slow to try changes in their instructional approach. Habits, colleagues, textbooks, and concerns about time and student response got in the way of trying something new. To remedy this, we asked participants at every workshop to select a "little change" that they would try before the next workshop, with a promise to report the change and the results to the group. We called these changes "little" as a way of acknowledging that major changes were too overwhelming for most people, even when they could understand the reasons for making them. It was also important to allow each person to choose the nature of the change so that it would be comfortable for him or her and aligned with school and classroom priorities. At subsequent workshops, participants reported on these changes, and many chose to adopt ideas they heard from their peers. As participants made changes, students' responses often helped them develop new ideas about their class. For example, Shelley Wogman, an algebra instructor at Spokane (Wash.) Community College, asked students to talk to each other about their homework at the beginning of class, rather than doing her own presentation of all the problems. As a result, students became more actively engaged throughout the class sessions, and she learned to value that engagement, despite her initial discomfort with the additional noise and energy in her classroom.

OUTCOMES FOR PARTICIPANTS AND STUDENTS

As a result of the project, we observed instructional changes such as using more student-centered lessons, emphasizing higher levels of questions and student reasoning, and concentrating more on learning targets, including student attributes, in lessons. College faculty made efforts to connect their classes to students' high school experiences, balanced the levels of questions on their exams, and used more small-group work and inquiry in their courses. Some initiated departmental collaboration at their schools, and several took on new leadership roles there.

A few teachers demonstrated little meaningful or enduring change. However, most of those teachers discussed dissatisfaction with status quo, awareness of how they would like things

PRINCIPLES FOR PROFESSIONAL DEVELOPMENT

Professional development should:

1. Be intensive, ongoing, and connected to practice.
2. Focus on student learning and specific curriculum content.
3. Align with school improvement priorities and goals.
4. Build strong working relationships among teachers.

Source: Darling-Hammond, Wei, Andree, Richardson, & Orphanos, 2009, pp. 9-11.

How the Riverpoint Advanced Mathematics Partnership aligns with the principles for professional development

(Principle number in parentheses)

- Cross-sector collaborative learning community (4)
- Responsive professional development design (1, 2, 3)
- Common standards (2)
- Rich array of topics and activities (1, 2)
- Classroom observations (1, 2)
- Little changes (1, 2, 3)

to look, including more open-ended questions and efforts to honor student thinking, and better classroom management. This disequilibrium suggests that they have the potential to make changes in the future.

As they made changes, many participants observed that students were showing more evidence of college-ready attributes such as increased perseverance, engagement, and responsibility for learning. In Brandon Mack's classes at Central Valley High School in Spokane, students decreased their reliance on him and took more responsibility for explaining concepts to each other and asking each other questions when they had difficulty. Molly Coulter taught algebra at Contract-Based Education, an alternative school in Spokane for students who had experienced long-term difficulty even attending classes. However, students liked her class so much they attended in far greater numbers than the room could comfortably accommodate.

The project structures contributed to participants' sense of commitment, collaborative learning, and initiation of instructional changes. These changes prompted students to develop and demonstrate essential attributes that were likely to improve their success in college. Participants developed a commitment to teaching intentionally and reflecting on their teaching, often through collaborative dialogue. Additionally, they developed deep mutual respect for each other, regardless of teaching level, and came to see themselves as part of a continuum of math educators. This perspective was a far cry from earlier antagonistic cross-sector efforts. This outcome demonstrates that other projects, especially those focused on student transitions, can accomplish similar results.

As planners and facilitators, we learned along with the participants. We learned how continuous evaluation and adjustment of project plans, according to participants' needs and responses, strengthened the work and results. These adjustments included engaging a cross-sector community in using norms of collaboration and problems solving, and asking each member of the group to make ongoing "little changes." We also learned that educators, with little time in their normal teaching environment to learn and reflect, appreciate opportunities to study and work with standards for student attributes, math content, and teaching and learning processes.

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