Partnership Without Hierarchy: Postsecondary Outcomes from a Collaborative Partnership

Janet Hart Frost, Washington State University
Jacqueline Coomes, Eastern Washington University
Kristine Lindeblad, Washington State University

ABSTRACT: In this article we describe a secondary-postsecondary collaborative partnership that addressed the issue of students' frequent failures as they transition from high school to college mathematics courses. Although the partnership did not take place in a professional development school, secondary and postsecondary participants worked together as peers to study pedagogy and content through a professional development approach. Postsecondary participants reported that they valued collegial relationships with secondary teachers and the shared learning and growth they experienced together. The significance of the study for educators and researchers, as well as research funders, is that it emphasizes the value of using collaborative partnerships to work together on studying and aligning instructional approaches, content, and curricula across levels and institutions. This alignment has the potential to strengthen students' abilities to successfully move through the transition points in their education.

NAPDS Essential(s) Addressed: #1/A comprehensive mission that is broader in its outreach and scope than the mission of any partner and that furthers the education profession and its responsibility to advance equity within schools and, by potential extension, the broader community; #3/Ongoing and reciprocal professional development for all participants guided by need; #4/A shared commitment to innovative and reflective practice by all participants; #5/ Engagement in and public sharing of the results of deliberate investigations of practice by respective participants; #8/Work by college/university faculty and P-12 faculty in formal roles across institutional settings.

All school-university partnerships share the goal of using cross-sector collaborations that bring P-12 educators and postsecondary faculty together to achieve something that neither sector could accomplish alone (Goodlad, 1991). There are many different types of these partnerships; one means of classifying these types is in terms of the ways that the school and university or other postsecondary partners interact. In a *service* type of partnership, one partner provides service that helps the other to accomplish its goals (McLaughlin & Black-Hawkins, 2007). For example, postsecondary participants may take the role of supporting teachers' classroom-focused action research (Baumfield & Butterworth, 2007; McLaughlin & Black-Hawkins, 2007). In these efforts, postsecondary faculty often

provide research information and methods for conducting studies in classrooms, thereby helping teachers study and improve instruction. In a *complementary* partnership, separate goals are pursued by each sector with little overlap (McLaughlin & Black-Hawkins, 2007). For example, postsecondary faculty may provide professional development (PD) for teachers while conducting research on K-12 teaching and learning (Grundy, Robison, & Tomazos, 2001; Peters, 2002; Zhang, McInerny, & Frechtling, 2010). Teachers and postsecondary faculty may each gain new knowledge, but the two kinds of learning are not necessarily linked.

A common theme in the research on both of these types of partnerships is the negotiation of cultural differences between the K-12 and university environments (Burton & Greher, 2007; Martin, Snow, & Franklin Torrez, 2011; Peters, 2002; Rice, 2002; Richmond, 1996). Teachers and postsecondary faculty have different priorities and pressures in their professional lives that can prevent the mutual respect, trust, and communication needed for successful collaboration. Additionally, they often lack knowledge of each others' professional contexts, so each partner may not understand or value the focus of the other. For example, in some Professional Development School (PDS) partnerships, although the PDS is intended to address common goals, school participants' focus is on student learning while postsecondary participants' primary concern is preservice teacher education (Burton & Greher, 2007; Lefever, Johnson, & Pearman, 2007). Research has demonstrated how these disparate goals can, in fact, interfere with support of each other. As a result, even if partners develop knowledge of and appreciation for each other's expertise (Zhang et al., 2010), they may not have see themselves as peers working together to achieve common goals.

In a *collaborative* partnership, different types of experiences and outcomes can occur because partners come together to focus on a common issue that has produced a need for a mutual effort that relies upon combined expertise (McLaughlin & Black-Hawkins, 2007). Neither partner is in an exclusive position of informing or providing service to the other. Instead, they must negotiate a means of working together that allows them to create a new non-hierarchical inter-institutional culture within the partnership (Coomes, Frost, & Lindeblad, 2012; Frost, Akmal, & Kingrey, 2010). This culture draws on the home cultures of each partner, but is a separate entity from those cultures, thereby allowing the definition of new roles and relationships within the partnership, including a sense of sharing learning and growth directed toward the common issue. Partnerships that focus on multiple goals, such as PDSs that include pre-service teacher training, in-service teacher professional development, and research on student outcomes, can fall into any of these three types of partnerships (Beaty-O'Ferrall & Johnson, 2010; Bosma, Sieving, Ericson, Russ, Cavender, & Bonine, 2010; Goodlad, 1993; Lefever et al., 2007).

Researchers recognize the importance of understanding postsecondary experiences in school-university partnerships (Barnes et al., 2011; Baumfeld & Butterworth, 2007; Martin et al., 2011; McLaughlin & Black-Hawkins, 2007: Richmond, 1996; Zhang et al., 2010). However, few studies have examined the effects of collaborative partnership on postsecondary partners. Therefore, the purpose of this article is to describe the characteristics of a collaborative partnership, the effects of the partnership on the postsecondary participants, and the significance of these characteristics and results. In order to discover these outcomes, three research questions were posed in our recent study of these partnership outcomes: 1) How did the postsecondary faculty describe the partnership? 2) What characteristics of the partnership did they value? 3) What professional impact did these characteristics have on them? After considering the project and the answers to these

questions, we discuss the value of this type of collaboration and the importance of developing similar collaborations in future years, thereby benefitting both educators and researchers.

Partnership Context

Partnership Issue and General Design

The partnership described in this study, for which the authors were planners and facilitators, was focused on addressing the issue of students' frequent failures making the transition from high school to college mathematics courses. Nearly 30% of students in the United States are placed into a remedial non-credit bearing mathematics course when they begin college immediately after high school graduation, and only 39% of these students eventually earn a 4-year degree, as compared to degrees earned by 69% of students who are not placed in remedial courses (Attewell, Lavin, Domina, & Levey, 2006). Even when students are placed into college-level courses such as college algebra, approximately 50% also fail to pass these courses (Gordon, 2008).

The partnership was developed to address this issue through five years of professional development (PD) work with the postsecondary participants described below and 43 secondary mathematics teachers from 17 schools. This project shared many of the characteristics identified with PDS. For example, it included ongoing PD for all participants, driven by the mission of resolving the high school/college transition issue in mathematics, an issue that neither sector could successfully address alone. Success was dependent on all participants engaging in reflection on and changes to their teaching practices, directed in part by the study of student work on common tasks administered across all levels and courses. It differed from a PDS model because there was no shared institution where all participants came together collaboratively to work with pre-service teachers and students. Instead, participants took the ideas back to their own educational institutions.

The partnership participants were grouped into two cohorts, based on the time that they began participation in the project. At the time of this writing, Cohort I had completed their fourth year in the project and Cohort II was midway through their third year. The members of each cohort worked together in small professional learning teams composed of teachers from one or two high schools and one postsecondary member. The teams also contributed to the larger professional learning community formed by each full cohort (Dufour & Eaker, 1998). Because of the two-cohort structure and the fact that there were more teams than postsecondary members, postsecondary members were often members of teams in each cohort.

Funding

The US Department of Education grants that provided primary funding for this project (approximately $370,000 during years one and two and $850,000 during years three through five) specified that only secondary teachers were considered participants; postsecondary faculty were considered "providers" in the grant language. However, the project was designed so that the postsecondary faculty participated with their teams in all PD activities, collected and analyzed the same type of data on their students' work, and initiated and reported on changes made in their instructional approach. Secondary and postsecondary participants received identical stipends each year, but during years one and two, substitute pay was provided only for secondary participants. (In years three through five, no substitute pay was provided for either level.) Funding for facilitators' observations and team meetings during years three through five were only available for secondary participants. However, additional funds from two other sources (approximately $34,000 during year two and $12,000 during year three) were used in part to expand postsecondary professional development and data collection, including providing time during year two for the postsecondary participants to meet and compare notes on their remedial courses and, in year

three, to conduct the interviews and observations discussed in this study.

Despite inequities in funding, for the most part there were only two differences in PD support for postsecondary learning. The first difference was that facilitators did not observe postsecondary participants' classes or conduct individual meetings to discuss instructional strategies with them as frequently as they did with the secondary teachers. Second, the postsecondary participants generally did not have the opportunity to work together as teams. In all other respects, the postsecondary faculty were generally treated as full participants throughout the project.

Collaborative Experiences

Each cohort attended up to 72 hours of summer and school-year workshops annually, focusing on pedagogy, mathematics content, and student work on common tasks. For example, during the four years of the PD activity, all secondary and postsecondary participants attended summer sessions that targeted exploration of college readiness standards (Transition Mathematics Project, 2004), algebra and functions, geometry, and probability and statistics. In the school-year workshop sessions, they analyzed student work on tasks they had administered in their classes, determining common strengths and misconceptions and ways they could address these misconceptions in subsequent lessons. Participants also discussed ways to increase cognitive demand through higher levels of questioning and rich tasks (Stein, Smith, Henningsen, & Silver, 2000), and incorporate a balance of problem solving, conceptual learning, and procedural skill development in their curriculum. To increase student access and deepen mathematical understanding, they learned how to use multiple representations, such as algebraic equations, tables, and graphs, for different types of mathematical tasks. In addition, each team was required to complete assignments together, including analyses of student work and development of lessons and units of study that incorporated the pedagogical principles discussed. They also had the option to conduct team lesson studies (Stigler & Hiebert, 1997).

Throughout the collaborative process, we made efforts to avoid or reduce tensions that are common when bringing together disparate groups, such as misunderstanding of each other's comments and assumptions about others' responsibilities for students' difficulties making the transition from high school to college math classes (Coomes, Frost, & Lindeblad, 2012; Frost, Akmal, & Kingrey, 2010; Richmond, 1996). For example, we asked participants to visit each other's classes to learn the contextual differences between secondary and postsecondary education. At the same time, we used a common reference point, the *College Readiness Standards* (Transition Mathematics Project, 2004) to identify the student attributes, learning processes, and mathematics content all students needed for college success, thereby emphasizing commonality despite contextual differences. We also emphasized community-building activities in which participants learned more about each others' interests, worked on mathematical problem-solving activities together, and employed norms of collaboration (Garmston & Wellman, 2009) that emphasized active listening, mutual respect, and assumption of others' positive intent.

Similarly, we used protocols for responding positively to others' work. Throughout the project, all participants were asked to make "little changes" in their instructional approaches (Coomes, Frost, & Lindeblad, 2012; Frost, Coomes, & Lindeblad, in press), and to report on the results of those changes. The changes were described as "little" as a means of emphasizing that participants were not expected to completely revamp their practices, but instead to initiate self-selected, manageable changes. Participants reported on these ongoing changes and their effects at all subsequent workshops. Changes included increased focus on learning targets, cognitively demanding questions that elicit student reasoning, formative assessment, and reflection on teaching and leadership roles. In many cases, participants chose to implement new ideas and approaches they heard from other participants.

Data Sources and Analysis

This qualitative study of the postsecondary participants is embedded within a larger study of the partnership itself (e.g., Coomes, Frost, & Lindeblad, 2012; Frost, Akmal, & Kingrey, 2010). In addition to data collected on secondary participants, the authors—who were partnership planners, facilitators, and participants—conducted a case study of one postsecondary participant during year two and interviewed and observed all of the postsecondary participants at the end of year three. Interview and observation data were supplemented by artifacts and field notes from workshops. In the semi-structured interviews, we encouraged narrative responses in which participants used stories to interpret and make sense of their project-related experiences in the context of their personal teaching history (Chase 2005; Connolly & Clandinen, 1995). Interview data were coded according to anticipated topics—such as impressions of the project—and emerging topics—such as ideas learned in the project that were now used in their own teaching (Creswell, 2009). Observations were a secondary source of data since too few observations were conducted to determine consistent instructional approach characteristics or changes. We used cross-case comparisons to identify trends and themes across the group of participants, grouping the responses into three main themes and related subthemes, as discussed below.

Postsecondary Participants

In this study, we discuss results from the nine experienced college and university mathematics educators who were postsecondary participants in this project. With the exception of authors Janet and Jackie, all participants are identified with pseudonyms (see details of participants' professional and partnership experiences in Table 1 below). Prior to the project, none of the participants had worked with those at the other institutions, although some had limited knowledge of each other.

Three of the participants, Susan, Karrie, and Jamie, were mathematics instructors at one of the local community colleges. Susan and Karrie both had mathematics education backgrounds: Karrie had a bachelor's degree in chemistry and a master's in mathematics education and Susan held bachelor's and master's degrees in secondary mathematics education. Susan had brief secondary teaching experience. Jamie had bachelor's and master's degrees in mathematics, with an emphasis on statistics. Although Susan, Karrie, and Jamie had taught at the community college for several years, they had not collaborated with each other before, and only Susan discussed prior collaboration with other instructors at her institution. The only reform or collaborative effort they identified at their institution occurred when their college purchased interactive white boards during year three of the PD project.

Donna and Paul worked at another local community college. The mathematics department at this institution was heavily involved in instituting reforms directed toward the transition issue and Donna, Paul, and their dean, John, were leaders in this effort. John had also been on the planning committee for the PD project. Donna studied engineering briefly in college but chose to complete an education credential with a major in mathematics and minor in physics. She taught high school for a short time and was involved in mathematics instructional reform in her secondary setting before moving to the community college. Paul began teaching undergraduate mathematics and computer science while in graduate school. He later taught high school and during that time, became involved in national mathematics education reform. He had worked on a mathematics doctorate, but had not completed it.

Roald, Mary, and Jackie were in the mathematics department at a local university from which many of the secondary participants had received their degrees in mathematics and/or education. Although this department was not involved in organized mathematics instructional reform, faculty often collaborated on course design. Mary had bachelor's degrees in secondary math and physics and a master's in math,

Table 1. Postsecondary Participant Backgrounds and Current Contexts

*Name**	*Teaching Background*	*Current Institutional Context*	*Department Collaboration on Pedagogy*	*Years in Partnership*
Donna	High School, Community College	Community College Mathematics	High level of collaboration; departmental reform	3
Jackie	Middle School, University**	University Mathematics	Frequent collaboration on common courses; no organized reform	3
Jamie	Community College	Community College Mathematics	Little collaboration; no organized reform	3
Janet	High School, University	University Mathematics Education	Little collaboration; no organized reform	4
Karrie	Community College	Community College Mathematics	Little collaboration; no organized reform	4
Mary	University**	University Mathematics	Frequent collaboration on common courses; no organized	4
Paul	High School, University, Community College	Community College Mathematics	High level of collaboration; departmental reform	2
Roald	University	University Mathematics	Frequent collaboration on common courses; no organized reform	4
Susan	Community College**	Community College	Little collaboration; no organized reform	4

* All names are pseudonyms except those of the authors.

** Had preservice secondary experience

and had brief secondary teaching experience. Jackie had bachelor's and master's degrees in mathematics and a doctoral degree in mathematics education. She also had brief experience teaching middle school. Roald had bachelor's, master's, and doctoral degrees in mathematics. Roald had no experience teaching high school, but developed interest in the project because he had begun teaching pre-service teachers in some of his mathematics courses and because of the difficulties his son had encountered with high school mathematics.

Janet worked on a branch campus for a second university. She held a doctoral degree in mathematics education and had extensive secondary teaching experience. As a branch campus faculty member, she did not have other mathematics or mathematics education faculty colleagues on her campus. She was involved in some collaborations with faculty on other campuses, but these did not address mathematics instructional reform.

Collaboration Outcomes

For all the participants in the project, the primary outcome of the collaborative partnership was a new sense of collegiality and commonality as learners and teachers within a culture that was related to but separate from their institutional cultures. Part of this sense of commonality came from realizing that all of their students struggled with the same misconceptions and difficulty developing the attributes and learning content learning necessary for resolution of the issue of high school to college transition issue that was the focus of the project. In this discussion, we focus on the postsecondary outcomes, with limited description of the secondary teacher experiences; information and findings related to secondary participants is available in other articles (e.g., Coomes, Frost, & Lindeblad, 2012).

Collegiality

The characteristic of the partnership experience most commonly described by the postsecondary participants in the interviews we conducted was the development of collegial relationships with the secondary teachers—each person valued these relationships and the interinstitutional culture they defined, but for different reasons. These reasons included connections or re-connections with high school teachers and perspectives, an increased sense of being part of a continuum, and interactions that supported learning. For example, Roald, who grew up outside the US, described how his increased knowledge of the secondary participants' work helped him to understand more about his students' prior experiences as well as his own role in mathematics education:

> [Making] connections now with the high school [teachers] is the most important thing because [when] I get [students] coming into the classroom, I want to know exactly what their experiences were ... I'm really interested in how they're teaching math in the high school ... .I feel now I'm part of a continuum. I used to think I was, was like that big jump, you know, they talk about the rift between levels, but now I think more along the continuum ... .I think I'm more maybe sympathetic to the students' struggles now than I used to be ... .I used to think that it was a problem of the US high school system and that they just weren't caring about the way they taught mathematics, so I was kind of naïve because I didn't know high school math teachers. But now I don't think that's true.

Roald's comments highlight his changing beliefs about the causes of students' difficulties, an important step in becoming a collaborative and non-judgmental teammate.

Shared Learning and Growth

The project work created a sense of commonality in learning together among secondary teachers and other postsecondary faculty. Jamie's comment illustrates this perspective:

> I learn from everybody else's experiences ... one person can make one comment and I'll take that with me and that'll be the biggest thing I take away from the whole weekend and, but that's *significant* because it was so powerful for me ... .this project has really opened my eyes to so many other ways to think about math besides my way.

An essential focus in this learning was awareness of the common student issues across all institutions, course levels, and educators, strategies for addressing these issues, and the need for all participants to employ means for improving student success. Susan's comment indicated that this was not a common viewpoint at her institution prior to the project:

> I think at the college level, at least in our department, we tend to focus on "here's the objectives, go in there and lecture and get it all done" and we don't [have] that time to learn how to teach, so I feel like I've learned a lot about questioning, a lot about strategies. I always think about ... what are the misconceptions and how could I assist them in understanding their misconceptions?

Jackie made a similar comment, specifically connecting it to the frequent project activity of comparing secondary and postsecondary student work on common tasks: "Another thing I get out of [the project] is the value of sitting down and looking at...how everyone did on the same problem and really thinking about what this means for future [and] previous instruction." An extension of this theme and Jackie's comment that we describe below is the fact that the learning these participants described was not

just theoretical, but had practical implications for their instruction.

Common Strategies

During the learning process, all participants learned common strategies they could employ to increase the depth of student understanding in both secondary and postsecondary level math courses. One of these strategies was the increased use of multiple representations in exploring mathematical concepts. Some of the faculty were familiar with this idea, but had not used this approach in their mathematical practice or teaching. Paul commented, "So often when you train in mathematics, you just want to do it one way... and then somebody from another team will say something and [I think] 'oh gosh why didn't I think of that?'"

Karrie also explained how the use of multiple representations changed her teaching:

> It's motivated me to seek out the multiple representations every time I go to class...Before I teach my lesson that ... I've taught so many times, I [think] differently about it, you know, how do I use multiple representations for that?...[For example,] when we did evaluating radical expressions, I used a table and I used a graph. I used a graphing calculator, which I have never used in that class. When we solved quadratic equations by factoring, I used a graphing calculator to graph it and [asked] "how can we be given a graph and find the solutions graphically?"

Karrie's description demonstrates how this change offered her community college students new ways to approach and think about mathematical problems.

A second common strategy was use of more cognitively demanding questions in the postsecondary participants' courses, rather than those that required only rote answers. Changes in questioning also demanded changes in the postsecondary faculty members' responses to questions. For example, Susan described the way "I try to think about what I'm asking...and not just give them all the answers... Instead of just saying 'Oh, here's the way it is,' I want them to kind of discover that." Jamie expressed a similar perspective:

> It's been significant growth...being able to ask questions that are more thoughtful... instead of just ...a question that involves just a quick answer, so that it involves more thought for the students. So I've been really working on those types of questions I'm asking, being more aware of what they're thinking instead of just looking for what I want the answer to be. And if they don't have that answer that I was expecting, I'm going into seeing why are they giving that answer. "What were you thinking here?"...I'm trying to do less lecture and more hands-on, having them explore things. I've tried things like walking into the classroom and just putting a question up on the board and giving them 5, 10 minutes to just think about it individually and then maybe talk with someone sitting next to them, instead of just going right into the lesson of the day.

In addition to the collegiality and shared learning, some faculty members discussed bringing the sense of shared values and strategies into their students' awareness and college experience as well. For example, Jackie looked for ways to help students find a connection between their high school and college courses:

> How do I better connect their experiences in high school?...What experiences are these [high school] kids having now and when they come to [my university] next year?...How can I make these experiences so that they have a smoother transition and understand better what they need to do? So I took the [approach of] being clear about all the objectives. "Here is

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> exactly what you need to learn for the next... quarter," but I [also] break it down by tests. ...I wrote it in "I Can" statements with columns, just the way that they do it at [high school].

Jackie's approach offered students more support with understanding the expectations of their college courses, expressed in ways that were likely to be familiar to them. Similarly, Janet studied the innovative forms of assessment some secondary teachers used and applied them in her own courses (Frost & Brown, 2011).

The collaborative work postsecondary faculty experienced was not limited to activities organized by the facilitators. In some cases, they initiated further collaboration at their institutions. For example, Susan, Karrie, and Jamie initiated a lesson study in which they designed and taught the same lesson in each of their courses, observed each other teach, and took note of students' responses in order to revise the lesson design for higher levels of student engagement and learning. This lesson study had the potential to be the first step toward departmental collaboration around the courses in which students were most likely to fail.

When asked if the changes in their teaching appeared to have an impact on their students, some of the postsecondary participants explained that they believed students were taking increased responsibility for their learning and understanding of how to be successful in college. For example, Susan commented, "I see the class is communicating and taking responsibility for their learning, and I can ask them deeper-level questions and they'll...[ask] great questions, not just procedural, 'Why is this happening when I did this?'".

Although the infrequency of postsecondary observations prevented the discovery of consistent evidence of the changes reported, we witnessed many of the changes described. For example, when Susan instituted a technique of asking students to compare their homework with each other at the beginning of class, we noted that students responded to this change by relying on each other more for all of their questions, and that Susan incorporated more opportunities for students to share ideas during the rest of the class.

Discussion and Conclusions

Many comments made by the postsecondary participants in our partnership suggested that they enjoyed and valued the experience of this non-hierarchical collaboration. They valued the perspectives of their secondary teammates and found them to be essential contributions to their own learning. In some cases, the postsecondary participants' comments indicated changing beliefs, such as Roald's shift away from blaming secondary teachers for students' difficulties, and toward feeling that he was part of an educational continuum. The postsecondary participants' new awareness of the concepts students understood or failed to grasp in both secondary and postsecondary mathematics courses and these participants' discussions of techniques that might improve students' success provided direction for changes in their instructional approaches, including their lesson and assessment designs.

Because this study focused on interviews with and limited observations of the postsecondary faculty, rather than on more extensive observations or student outcomes, it is premature to make assumptions about the level of change that occurred in the postsecondary participants' instructional approach. However, it is important to note that most of the postsecondary members described changes they believed would improve student learning and success in their courses. Additionally, they discussed becoming more focused on how students responded to their courses, as evidenced by changes they perceived in their students.

Finally, some of the participants took on the roles of agents of change in their departments, initiating collaboration where none had existed before. These efforts suggest that they developed a sense of being part of a teaching and learning culture that was a separate entity from their home

departments and institutions, but had the potential to affect those home cultures. In the partnership culture, they discovered and developed new types of responsibilities and relationships that grew from their needs to develop and initiate change and report the results back to the group for further learning. At the same time, they shared a process of learning and growth that could help improve student success in making the high school to college transition.

The changing roles of the postsecondary participants also affected the roles of the high school teachers. While so often the problems in students' transitions from one level of mathematics to the next, such as middle school to high school or, in this case, from high school to college or university, prompt blame of one sector by the other, in this partnership, post-secondary participants experienced the same difficulties secondary teachers did: their students had the same misconceptions and difficulties learning mathematics. By having participants engage in the same activities (e.g., collecting and examining student work or designing assessments and lessons) and facilitate discussions about the issues and solutions, the postsecondary participants gained a deeper understanding of the difficulties faced by their high school partners. Because of the design of the partnership as a collaboration focused on finding common solutions, postsecondary faculty implemented ideas generated by the high school teachers, and openly expressed appreciation for these ideas. In this way, the secondary teachers' roles in the partnership were not just as learners, but also as instructors or guides, respected for their experiences and insights. And the teachers clearly recognized and appreciated this new role. For example, Brian, one of the high school participants, commented,

> The college side wasn't "Oh you guys need to fix this"...it was more like "Hey, we're all trying to do this together. Let's figure out good ways to do it." ...We [were] not looked down upon here because we're high school people.

Although the secondary participants were not the focus of this study, it is important to note that they benefited in many of the same ways as the postsecondary faculty. Secondary teachers valued their new understandings of common student mathematical strengths and misconceptions at both levels, as well as the collegial relationships and shared experimentation and learning and new strategies they developed with the postsecondary faculty (Coomes, Frost, & Lindeblad, 2012). Through discussions with postsecondary faculty about the attributes expected of students in college mathematics classes, secondary teachers developed a shared understanding of both the challenges and supports their students would encounter in later mathematics classes.

The results of this study of postsecondary participants are similar to those described in several PDS studies (e.g., Dangel, Dooley, Swars, Truscott, Smith, & Williams, 2009; Lefever et al., 2007; Richmond, 1996) and other school-university partnerships (Martin et al., 2011; Zhang et al., 2010). For example, over a decade ago, PDS researchers discussed stages of partnership in which PDS postsecondary and secondary participants' emerging roles and perceptions went from experiencing estrangement from and distrust of each other to a sense of collaboration based on shared efforts and thinking (King, 1997). Other researchers demonstrated how postsecondary faculty developed new methods of instruction based on their PDS partnership experiences (Berry & Catoe, 1994). These kinds of changes were credited to collaboration within a shared context and bringing together reflection and research with instructional improvements (Darling-Hammond, 1994; Whitford, 1994).

Although these results may not be new, the nature of the partnership described in this study does offer novel insights. The hallmark of this

partnership was that it was a collaboration in which secondary and postsecondary participants worked together to increase their understanding of effective mathematics pedagogy and to devise and implement instructional changes that had the potential to increase student success at each level. The shared issue of student failures and the group efforts to reflect on new ideas and initiate innovative changes created an environment in which all participants worked as peers, without any hierarchy of authority or responsibility. All participants were therefore both learners and experts, despite the lack of the common institutional setting provided in PDS partnerships.

The results of our study of this project provide a demonstration of the benefits of designing a school-university partnership in which all participants have the *same* goals of improving student learning. The benefits observed in this study provide an impetus to define and shape the roles in a partnership so that all participants are genuinely respected for their expertise and expected to learn from others as they work together to gain a deeper understanding of the difficulties students encounter and potential means for resolving them. This relationship is particularly important when the participants in the partnership are on two sides of a transition some students find difficult. In this situation, much like PDS models in which student outcomes are closely tied to pre-service teachers' learning and abilities to become strong in-service teachers, it is especially important to develop trust, common goals, and common language (Rice, 2002).

This study thus contributes to our knowledge of ways that a school-university partnership can be of equal benefit to both participating sectors, thereby providing information that has implications for both pedagogical practices and our scholarly efforts. The significance of the study for educators and researchers—as well as for research funders—is that it emphasizes the value of collaborative partnerships through which a range of cross-institutional constituents can work together on aligning instructional approaches, content, and curricula. This alignment has the potential to strengthen students' abilities to successfully move through the transition points in their educational lives.

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Janet Hart Frost is an assistant professor in mathematics education at Washington State University Spokane and a former secondary teacher. Her research focuses on influences on mathematics teachers' instructional decisions.

Jacqueline Coomes is a mathematics teacher educator at Eastern Washington University, with interests in mathematical knowledge for teaching and students' learning of specific mathematics content.

Kristine Lindeblad is currently an adjunct professor at WSU and math director of the Riverpoint Math/Science Project and enjoyed being a high school math teacher, coach and curriculum coordinator.