

Partnership for Research in Inquiry-based Math, Science, and Engineering Education (PRIME)



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<http://www.engr.washington.edu/prime/>



PRIME Leadership

Principal Investigators:

Denice Denton, Dean, College of Engineering (UW)

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Philip Bell, Assistant Professor, College of Education (UW)

Patricia MacGowan, State Director, MESA (UW)

Reed Stevens, Assistant Professor, College of Education (UW)

Senior Personnel:

Elham Kazemi, Assistant Professor, College of Education (UW)

Rosalind Wise, Science Curriculum/Mathematics Specialist (Seattle Public School District)

PRIME Goals

- Enhance learning among middle school students, teachers, and Fellows in Math, Science, and Engineering
- Develop a cadre of scientists and engineers who will enter the workforce ready, willing, and able to continuously improve the quality of K-12 education in the next century
- Enhance the diversity of the Math, Science, and Engineering workforce



School-University Collaborative Partnerships

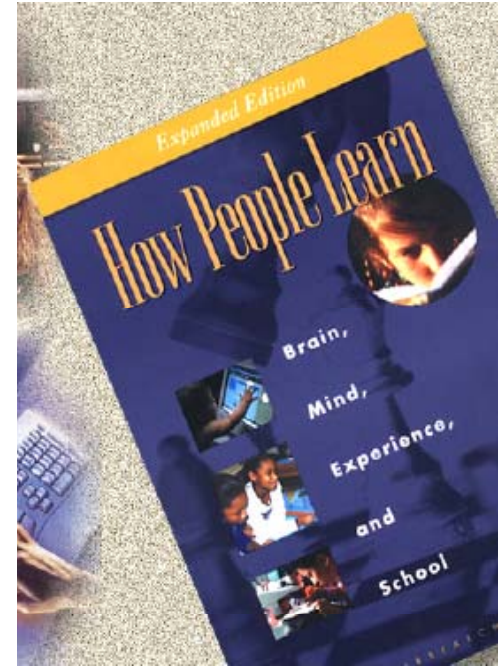
- Long history of research showing the problems associated with university-school partnerships (e.g., Goodlad and Sirotnik, 1988)
- True partnerships between university and school participants are ‘symbiotic relationships’ exhibiting *mutual interdependence* and *reciprocal benefits* (Goodlad, 1988)
- Individuals give “one-way benefits” to another (Radinsky, Bouillion, Lento & Gomez, 2001), resulting in a professional development experiences for all involved (Linn, Shear, Bell & Slotta, 1999)
- PRIME moved beyond the “STEM grad as content expert” model—all involved were encouraged to adopt an ‘inquiry and learning’ stance
- It is a distributed expertise approach to engaging in the ‘problems of practice’ (Brown, 1993; Darling-Hammond, 1994)

The PRIME Model

- Established year-long collaborative partnerships between STEM Graduate Fellows, middle school science & math teachers, and undergraduates
 - Careful pairing and framing process for partnerships
 - Fellows spent sustained periods of time partnering with a small number of teachers on innovative classroom efforts
 - 36 partnerships (35 grads, 48 teachers, 13 undergrads)
- Actively fostered a cohort experience for the Fellows
- Leveraged other NSF sponsored education research and reform projects in the region
 - Including local systemic projects and other research (SCOPE, WISE, CAEE, ThinkerTools) and outreach projects (MESA)
- Conducted research on the partnerships

A Year in our PRIME...

- Spring: Recruitment, review of applications, interviews, selection, classroom visits, and partnership formation
- Late Summer: 36-hour intensive course on...
 - how people learn
 - how to promote inquiry instruction
 - working in collaborative partnerships
 - educational change through inquiry
 - culture of classrooms
 - gender and ethnic diversity
- Fall to Spring: Partnerships actively working; sideline “research group” seminar held for fellows; quarterly whole group socials
- Late Spring: Public showcase presentation of accomplishments with teachers, fellows, and students



Partnership Activities...

- Partnerships were supported in identifying and accomplishing locally-compelling, core projects of their own design
- Activities naturally spilled-out into many other activities and venues
- Varied partnership activities (handout, web site has detail)

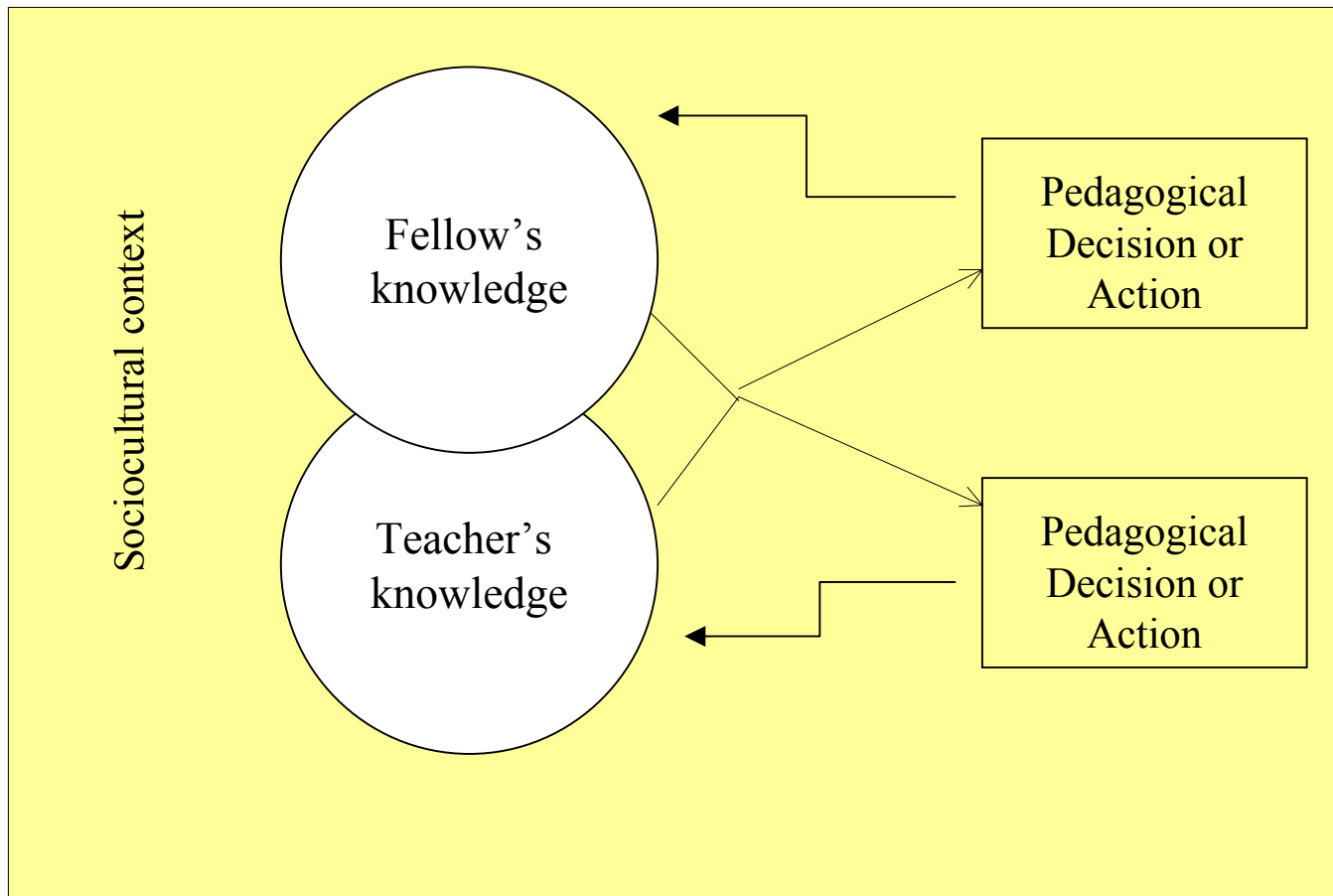


PRIME Research

- Internal evaluation with fellows, teachers, students, and staff
- Detailed partnership case-studies
 - Methods: Systematic observation, semi-structured interviews
 - What type of professional development takes place with the Fellows and the Teachers?
 - How is student learning and thinking supported through various partnership efforts?
- Analysis of talk in the bi-weekly “research group” seminar
 - What are their perceptions of public education and learning?
 - What have they learned about promoting inquiry in the classroom?
 - What is the relation of STEM fields and education?
- Track diffusion of partnership products and results
- Follow fellow professional trajectories and influence of involvement
- Status: Dissertation, annual student projects, papers in process

PRIME Partnership Interactions

Knowledge Rejection

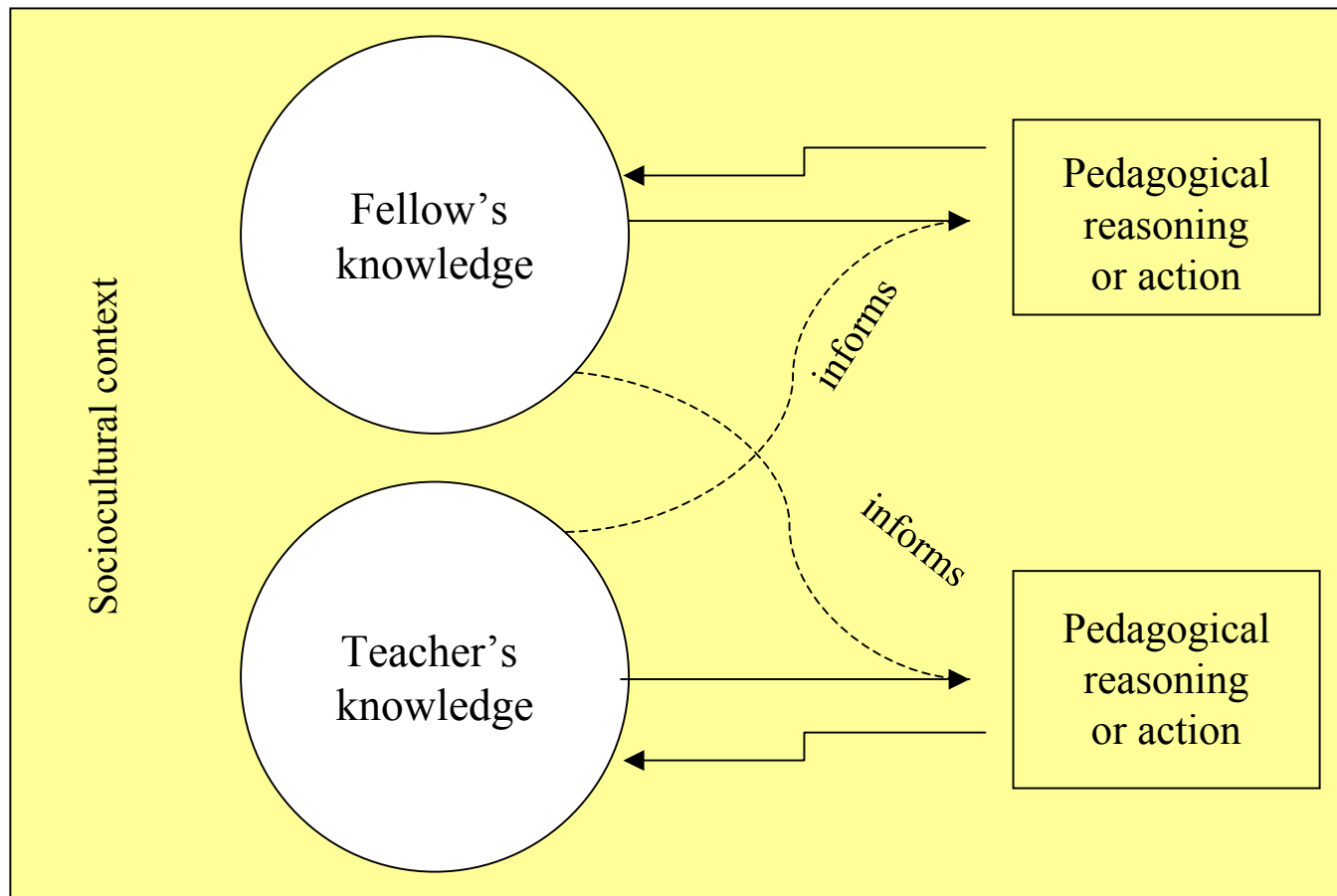


Diffs in pedagogy
Time pressures
Lack of relationship

From: Holmlund Nelson, T. (2002). *Dialogic inquiry in school-university partnerships: Case studies of teacher-graduate student partnerships in science education*. Unpublished Dissertation, University of Washington.

PRIME Partnership Interactions

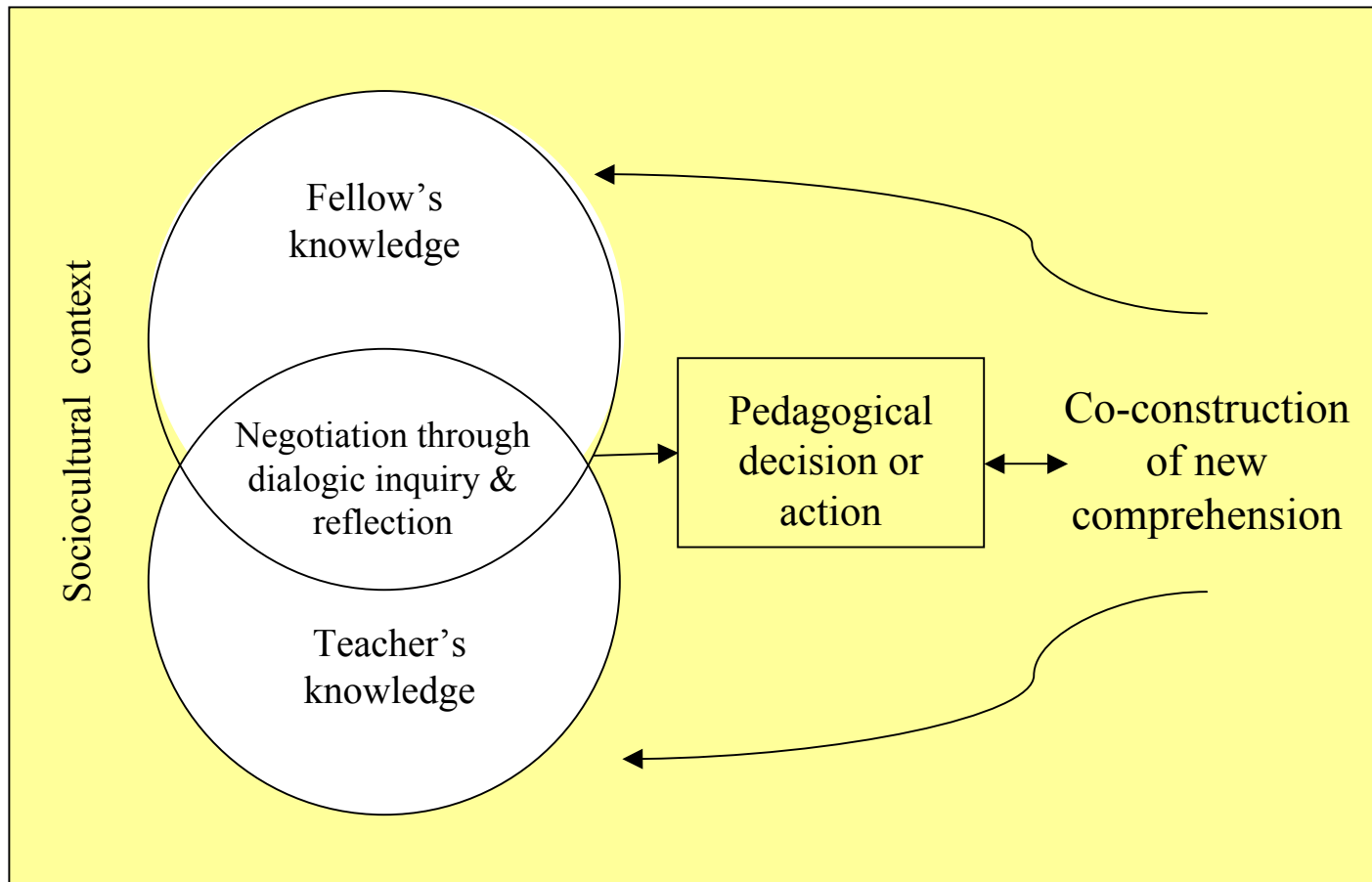
Knowledge Consultation



From: Holmlund Nelson, T. (2002). *Dialogic inquiry in school-university partnerships: Case studies of teacher-graduate student partnerships in science education*. Unpublished Dissertation, University of Washington.

PRIME Partnership Interactions

Knowledge Negotiation



From: Holmlund Nelson, T. (2002). *Dialogic inquiry in school-university partnerships: Case studies of teacher-graduate student partnerships in science education*. Unpublished Dissertation, University of Washington.



PRIME Effects

- Research orientation of fellows productively tapped to pull them into educational inquiry and learning
- Relationships formed within cohorts and with PRIME staff (e.g., informal collaboration and social interaction)
- Fellows became involved in broader educational processes (e.g., district curriculum adoption, equipment selection, grant writing)
- Fellows learned deeply about the complexities of public education (teaching, student perceptions, school variation and inequities)
- Fellows brought educational research back to home departments
- Partnership activities and research presented at professional meetings
- Fellow's classroom research published in *American Biology Teacher*
- Fellow became director of education on STC on Materials and Devices for Information Technology Research
- Fellows are now becoming university faculty, liberal arts & sciences college faculty, classroom teachers, and industry employees



PRIME Issues & Lessons

- Pervasive time pressures (out-of-class meetings, instruction)
- Many fellow's juggling education and research agendas
- Compatible personalities and the establishment of relationships proved central to success
- Many groups hit up against lack of established norms for symbiotic partnerships in schools
 - i.e., fellows are not student teachers, etc.
 - Sustained university-school partnerships with distributions of complementary expertise are not a dominant model
 - Led to early mis-judgments about the possibilities and work
 - Required that the purpose of partnerships become a central focus for negotiation and learning
- Fellows were surprised that the “grammar of school” (Tyack & Cuban) did not easily support activities they saw as “real” science, math or engineering

Keeping the purpose of university-school partnerships in focus

- As one fellow described what she learned about public education she said...
 - “[The school district] is described by the teachers in the district as one of the bottom districts in the area, and the teachers at my school describe the school as the bottom school in the district so it’s like the teachers within the school are acknowledging they’re the bottom tier. . . .And I talked to some students in the class and they think the same thing. . . . I feel like there’s so much deeper social issues going on in this school.”
 - There was “just a basic attitude that pervades the school that I’ve noticed among the teachers and the students that this is Adams, we’re not ever going to go anywhere. We’re the McDonald’s workers of the future. And I’ve heard a lot students say that. A lot of students.” One student said: “None of us will be anything that ends in I-S-T.”
- Sustained, symbiotic partnerships are deeply needed. They can lead to classroom changes and student learning—but they also lead to personal insights into the nature of public education.

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