A School District-University Partnership for Innovation in Elementary Science Teaching and Learning

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Beginning in 2006, learning scientists and science educators from the University of Washington's College of Education and Learning in Informal and Formal Environments (LIFE) Center, and district leaders, curriculum specialists, and teachers from the Bellevue (WA) School District have been involved in Design-Based Implementation Research (Penuel, Fishman, Cheng, & Sabelli, 2011); iteratively designing, implementing, and testing science inquiry environments that offer diverse groups of 2nd and 5th grade students agency to inquire about personally-relevant, socially-consequential science problems (Tzou & Bell, 2010).

PHASE 1 – Partnership Begins

Persistent Problems of Practice

- Superintendent Riley approaches UW's John Bransford for a "curriculum audit" to compare how the district's common curriculum aligns with the principles in *How People Learn*.
- Members of the UW-LIFE Center team observe in classrooms and interview principals and teachers to learn more about the district context.
- BSD administrators and curriculum developers learn more about *How People Learn* and COE's research in learning in the formal and informal environments through four day-long presentations.
- A smaller joint BSD/UW team meets to focus on challenges in science.

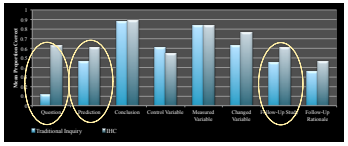
- One elementary science unit was identified as a focus to implement these changes.

Iterative, Collaborative Design

- One team from UW and one team from BSD redesigned the same curriculum unit.
- The result of the parallel design process did not match: the BSD team focused on terrestrial environments as the vehicle for learning the science and the UW team focused on aquatic environments.
- One combined team collaborated around isopods. Three teachers agreed to pilot the revised unit *Isopod Habitat Challenge* (IHC) in 2007-2008.

Developing Theory & Knowledge

- A full research pilot on the revised IHC was conducted in 2008-2009.
- The research study focus was on systematic inquiry and the method was comparative across treatment and non-treatment classrooms.
- Outcomes were promising.



System Capacity

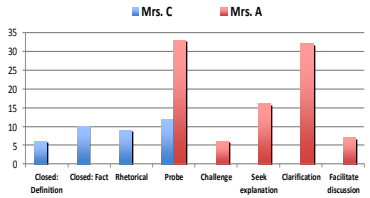
The revised unit became a district approved curriculum option and BSD supported it.

PHASE 2 – Partnership Deepens

- Partnership generates a joint proposal to NSF to address early elementary science curriculum which lacks student agency and relevance.
- Expand research team to include expertise in learning in formal and informal environments (UW's Philip Bell).

- Effort involves redesigning a full year of curriculum materials at 5th grade and two units at 2nd grade
- Design teams are comprised of researchers, science curriculum developers, and classroom teachers.
- Additional design expertise includes content specialists and local stakeholders.
- Unit revisions are informed by student interviews, teacher interviews, feedback during professional development and classroom observations.

- Partners co-developed a set of principles to inform the curriculum design. Though the principles reflected the three partners, they have evolved into a more coherent set.
- Looking at science learning and science inquiry in redesigned classes compared to classrooms with the existing curriculum.
- Research compares 5th grade across a year and 2nd grade through two trimesters as well as considers the link between the grades.



- Increasing numbers of research classrooms throughout the years of the partnership and additional classrooms using the materials supported by the district but not being researched.
- BSD taking on more ownership of professional development for each unit.

Partners:

Kari Shutt (UW)
Angie DiLoreto (BSD)
Carrie Tzou (UW)
Nancy Vye (UW)
Leslie Herrenkohl (UW)
Andy Shouse (UW)
John Bransford (UW)
Philip Bell (UW)
Giovanna Scalone (UW)
Andrew Morozov (UW)
Hank Clark (UW)
Laura Gaylord (BSD)
Amy Winstanley (BSD)
Allison Snow (BSD)

PHASE 3 – Partnership Moving Forward

- Alignment between research observations and district observations lead us to focus on preparing teachers to position students for greater agency.
- Additional alignment between research and district goals that focus on implementation of the Next Generation Science Standards.
- District STEM initiative responds to national and community influences.

District	• Next Gen Science • Teacher Evaluation
Researchers	• Next Gen Science • Teacher PD in Science
Community	• Elementary STEM Initiative

Teacher professional development: teacher agency for student agency

Design Principles:

- ❖ Challenge Based
- ❖ Sustained Inquiry
- ❖ Feedback and Revision
- ❖ Student Choice and Agency
- ❖ Build on prior interests and identity
- ❖ Overlap science curriculum with lives of students
- ❖ Leverage students' out-of-school expertise in instruction

Challenges:

Maintaining the partnership through changing district leadership; 5 superintendents in 7 years.

Managing the timeline of research versus the timeline of school implementation.

Sustaining a partnership and an initiative **across funding cycles.**

School district has **structures** for professional development, use of teacher time, and use of the curriculum and assessments that sometimes hinder quick innovation.

Benefits:

Value added for **student learning** and increased student **investment** in their learning.

Greater **teacher learning** opportunities.

Better **prepared to implement** an initiative district-wide.

Partnership has **expanded** beyond initial focus to elementary science STEM school, AP redesign work.

Learning design principles may be **scalable** beyond the current context.

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