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All young people should be able to decide their futures.

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Design-based research, collaboration & co-design

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Background on DBR & Partnerships

Design Research Partnerships
What they focus on…

Schools / Classrooms

Districts

to iteratively

Integrating R+P perspectives

co-design, test, refine, and adapt

tools, routines, contexts

embedded in education improvement efforts.

Informal Science Ed

Professional Networks

Research Communities

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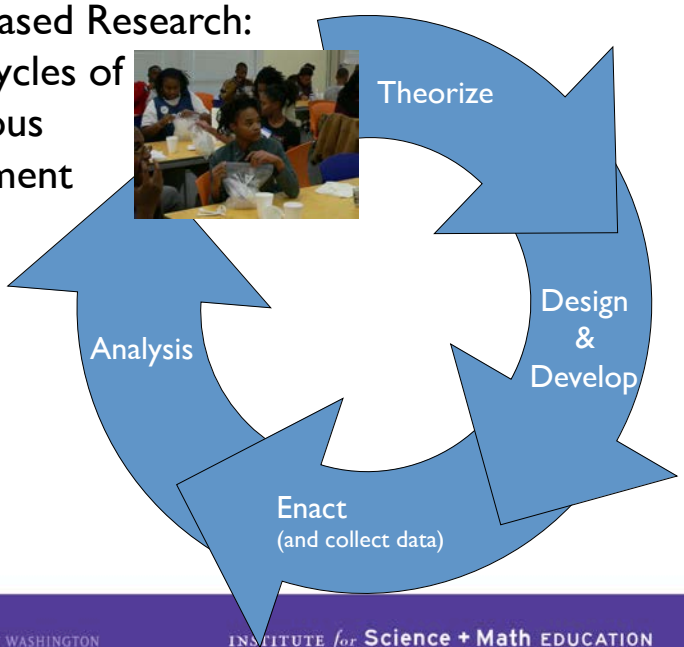
Design-Based Research: Macro Cycles of Continuous Improvement



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Design-Based Research

- DBR is the only method in the social sciences focused on cultivating & studying innovation (Bereiter, 2005)
- DBR typically conducted by a distributed expertise research-group / partnership (learning scientists, educators, technologists, community members, etc.)
- Typically multi-method (based on 'theory work')
- DBR should be considered a form of educational inquiry alongside others (historical, experimental, ethnographic, philosophical/conceptual, sociological,…)
- Different theoretical families of DBR exist (Bell, 2004)

A Model of Design-Based Research (DBR) Centered on Equity

- *Social design experiments* are a promising approach to cultivate expansive learning experiences through participatory design based research (Gutiérrez & Vossoughi, 2010)
- Researchers and practitioners collaborate to develop lived arguments that explore what is possible in partnership with non-dominant communities using a grammar of hope, possibility, and resilience (Gutiérrez & Jurow, 2014)

Critical Theory & Design Research

Lave – Problematics

"A problematic includes assumptions (an ontology, an epistemology, an ethics) about relations between persons and world, the nature of human being and how it is produced, in what terms we can know it and the nature of knowledge" (150).

Critical Theory Model of Ethnography: in which social life is represented and analyzed for the political purpose of overcoming social oppression, particularly forms that reflect advanced capitalism through the overt polemics of the researcher (Habermas, 1971)

Think about your 'program' of DBR research.

What is the 'politic' associated with it? What is the political agenda or goal associated with the research and the design focus of your DBR study?

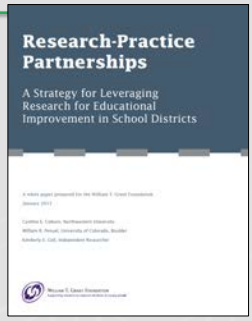
How does represent "progress" from the perspective of the contemporary politics of education and learning?

Research-Practice Partnerships

Long-term collaborations between practitioners and researchers that are organized to investigate problems of practice and solutions for improving system outcomes.

Leverage distributed expertise of the team to make progress on negotiated goals associated with educational improvement.

Coburn, Penuel & Geil (2013). *Research Practice Partnerships*, W.T. Grant Foundation.



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Design Research Partnerships

- Place-based
- Co-design and test strategies for improving teaching and learning locally that also yield general knowledge about teaching and learning
- Researchers and practitioners engage in collaboration at every stage of the process

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Building Capacity for Promoting Educational Equity at Systems Scale

- *Design-Based Implementation Research* (DBIR, Penuel, Fishman, Cheng & Sabelli, 2011) is a methodological approach for systems-level improvement and theory development through design-focused Research-Practice Partnerships.
- Focus is on "developing and testing innovations that can improve the quality and equity of supports for implementation of reforms" in real-world contexts (Penuel & Fishman, 2012, p. 282)

(With a nod to Savitha Moorthy for this slide.)

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Design-Based Implementation Research: Summary of Principles

An approach to research and development

focused on addressing persistent problems of practice

from multiple stakeholders points of view

that engages educators, subject matter specialists, and educational researchers in collaborative, iterative co-design

and that develops knowledge and theory while also building capacity for continuous improvement

Partnerships are Central to DBR

- Re-center the work to focus on issues and opportunities related to educational practice
  - Allow for research to focus on *ontological innovation* (e.g., CL) within fields of practice
- Leverage the distributed expertise of relevant stake-holders (e.g., practitioners, ed researchers, professional/ProAm experts, community members,…)
- Can shift the locus of decision-making for designs to practitioners / community members
- Cultivates shared governance of the work—and helps to disrupt classic university/school hierarchy

Q&A

Two Examples & Partnership Practices and Principles

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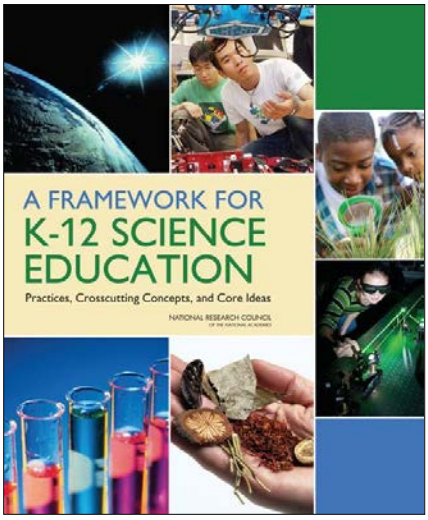
Implementation of New Vision for K-12 Science Ed Should Center on Equity



NEXT GENERATION SCIENCE STANDARDS

The Framework & Standards were reviewed and refined by over 40,000 teachers, scientists, engineers, educational researchers, youth and other stakeholders in K-12 science ed.

Info Online: tinyurl.com/ScienceFramework & nextgenscience.org

Community Based Design: Indigenous peoples & Science education

"Land is everything to my people." Jasmine Gurneau

Land is, therefore we are, therefore I am (Bang et al., 2014)

Communities involved in research

- Urban inter-tribal Native community (Chicago)
- Urban non-Native communities (Chicago/Evanston)
- Rural Native community in Wisconsin (Menominee Nation)
- Rural non-Native community in Wisconsin (Shawano)

Research team: Primarily comprised of people from the communities involved – not graduate students – work is dependent on funding!

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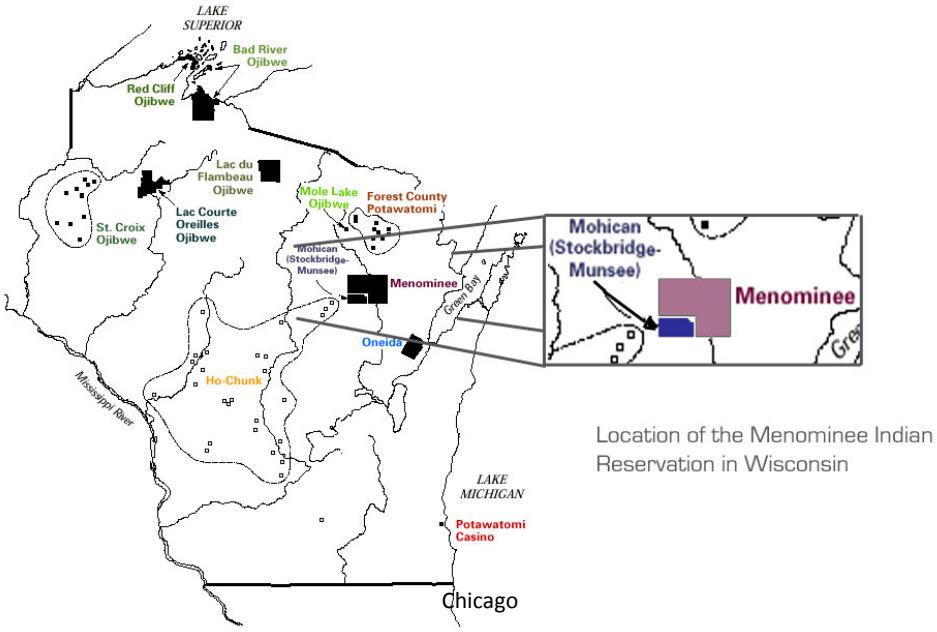
Map of Menominee Reservation in Wisconsin



Location of the Menominee Indian Reservation in Wisconsin

Core Research & Design Goals

- Contribute to capacity & needs of Native nations to effectively respond to 21st century demands (e.g. climate change and shifting territorial politics)through a focus on science education;
- Contribute to the resiliency and cultural continuity of our communities;
- Cultivate the innovation and creativity of our youth towards authentic futures.
- Contribute to foundational knowledge about human learning and development

Learning environments focused on **complex ecological systems**

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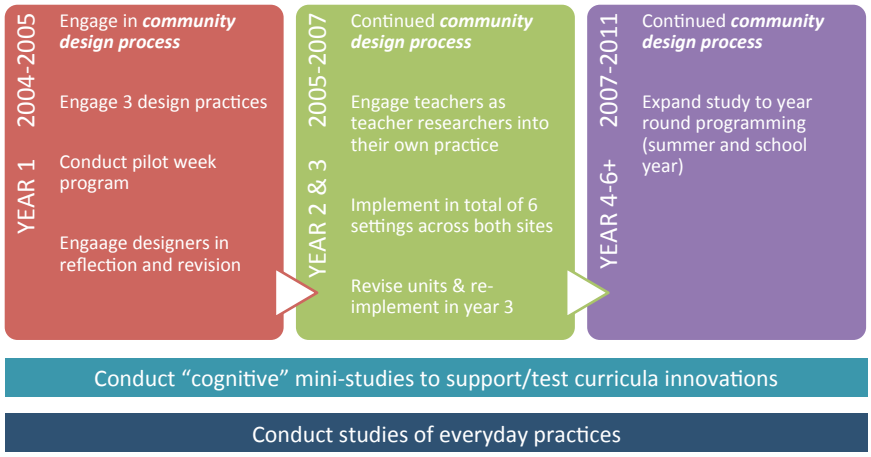
Study Timeline



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Community Based Partnerships: Key Sensibilities

1. **Critical historicity:** Recognize families and communities histories and experiences with schooling and science.
2. **Place based:** Locate science in communities (places) and everyday practices of families and communities.
3. **Learning in everyday life and across generations:** Leverage the experiences and expertise developed in everyday life.
4. **Navigational pedagogies:** Respecting, engaging, and supporting the navigation of multiple ways of knowing.

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Community Based Design Partnerships: Key Sensibilities

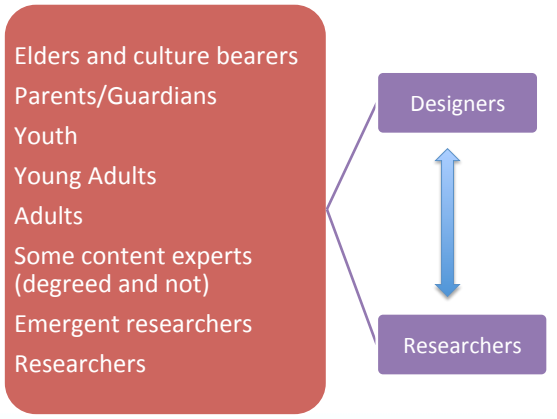
5. **Roles and leadership expansion:** Open new opportunities and roles for partners: broaden participation.
6. **Shared governance.**
7. **Equitable distribution of resources.**
8. **Strategic transformations of institutional relations:** planning, implementing, outcomes…

Structuring institutional relationships

- Collaborative projects – not subcontracts
- Institutional mentorship (Infrastructure, IRB, indirect costs agreements)
- Tribal Nation IRB approval

- Intentional about locating the center of gravity in the community – thus the "social gravity" (Erickson, 2006) of the community is always shaping the work.

Developing design politic: Who is designing? Towards what ends?



Who defines and participates in the problem analysis?
- *Whose needs?, What opportunities?*

Who are the decision makers?

- Historically, for students from non-dominant comunities decision makers are not drawn from their communities.
- Deeply situated and historically rooted level in history of formal education and Indigenous communities.

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Forms of critical reflective co-design practices

- **Talking Circles: Oral mapping of people's conceptual perspectives and experiences.**
  - Built on common community practice
  - "Flat(not hierarchical) structure"
  - Builds inter-subjectivity between designers.
  - Invites people's personal selves to the process.
- Focused on analysis of the "historically accumulating structural tensions within and between activity systems (Engestrom, 2011, p. 609)" as **lived, felt, and responded to** by community members.
- **River of Life: Mapping histories and more**
  - Makes structural continuities visible.
  - Shifts peoples theories of causality and inferential reasoning.
- *Examples of planned critical circles*
  - Meanings of culture
  - Experiences with education
  - Experiences with focal content/ discipline
  - Perspectives of youth and about youth

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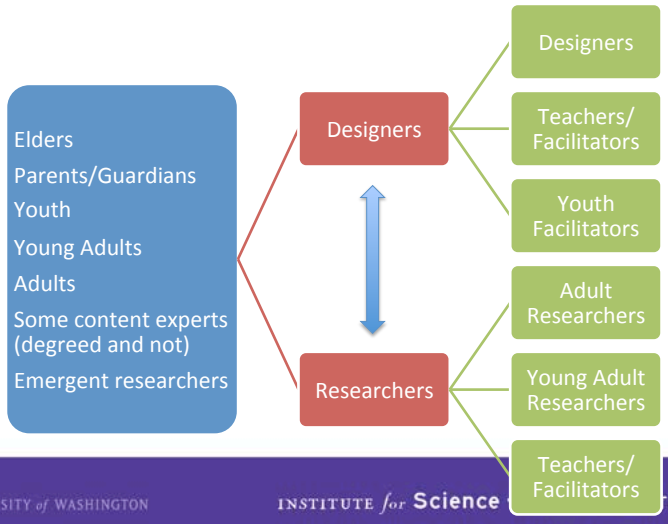
Who is implementing? Who is researching?

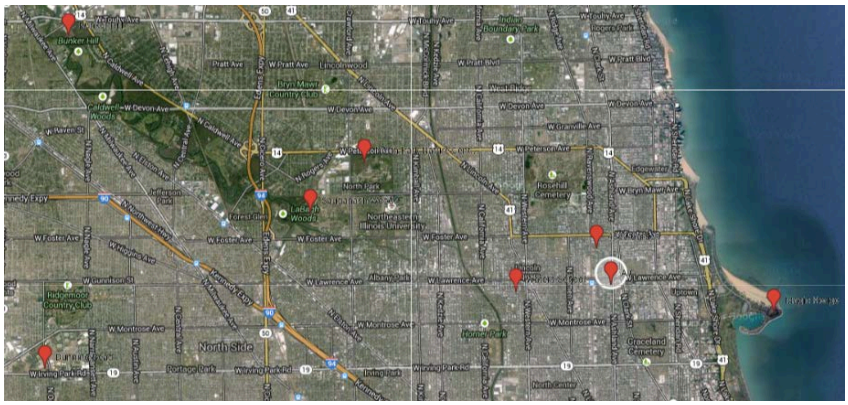
Evolution of Roles.



Innovating co-design practices: Land (place) Based Design Practices

- "In order for us to teach this to our youth we need to do it together first."
- Began walking and talking specific places in order to consider the learning affordances of the those places.
  - E.g. 100 year old cotton woods in Chicago – what history has the tree lived?
- These walks defined core focal phenomena.
  - Change planning from linear process to developing expert models of the places and adaptive facilitation.
- Focused on Indigenous knowledge systems towards epistemic heterogeneity and navigational pedagogies

Anchoring places of design work (routine design engagement → implementations)



- American Indian Center Garden
  - Metra Embankment
- 4880 N. Hermitage Garden
- North Park Nature Center
- Waters School Garden
- Montrose Dunes
- Sauganash Forest Preserve
  - Gompers Restoration Site
- Bunker Hill Forest Preserve
- Dunning Reed Conservation Area

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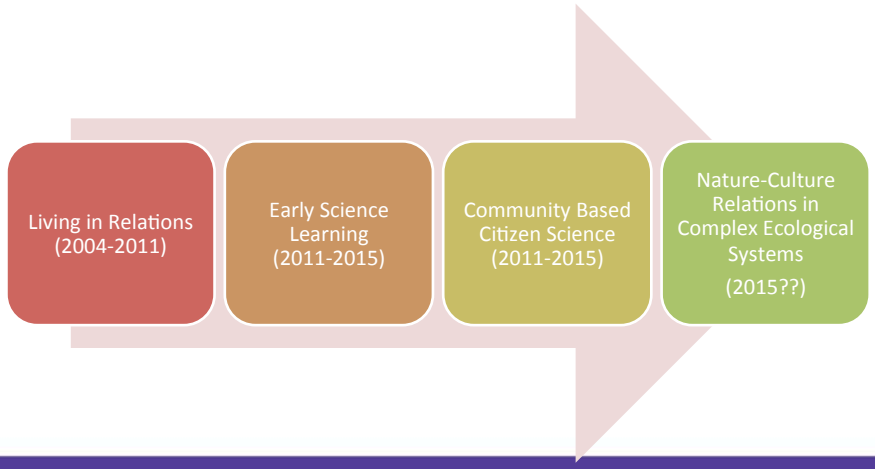
Evolving projects within partnerships…



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Early Science Learning

- Early Science Learning – Tribal Headstarts and community based EL programs
- Development of 5 core science practices across units
- Collaborative design with parents, teachers and other community

UTE *for* Science + Math EDUCATION

Community Based Citizen Science

- Weekend, After-school, and Summer Programs
- Also, professional development for in-service teachers.
- Collaborative design with communities

Chicago Tribune
LIFE & STYLE

Rare squash is born again

Ancient squash seeds bring history to the harvest at American Indian Center garden

Evolving partnerships… Towards Axiological innovations

- Going on 12 years of research partnerships
- New projects and foci emerged as result of work
- Shifts in people and histories with partnerships
- Stabilizing innovations and expanded partners…

Expanding to new communities
- Expansive Meanings and Makings in ArtScience
- Organizing across city based programs

→

State Level Engagement
- OSPI
- BCCI: 72 Native serving organizations institutions
- Organizing EC

→

Expanding fields: Towards Family Engagement
- Focus on multiple cultural communities

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Research+Practice Collaboratory

Developing teacher-researcher partnerships to investigate problems of practice and develop useful instructional strategies and tools that can be shared broadly.

Collaborating Organizations
- Exploratorium (Bronwyn Bevan, PI)
- University of Washington Institute for Science + Math Education
- Education Development Center, Inc.
- University of Colorado, Boulder
- Inverness Research Associates
- SRI International

Four Themes of Work

STEM Practices	**Formative Assessment**
Interactive Technologies	**Learning Across Settings**

Partnership for Science & Engineering Practices
Seattle & Renton School Districts
Photo by Institute for Systems Biology, June 2013

Partnership
For Science & Engineering Practices

A Math and Science Partnership Award from the Washington State Office of the Superintendent of Public Instruction

SEATTLE PUBLIC SCHOOLS

Renton SCHOOL DISTRICT

Institute for Systems Biology
Revolutionizing Science. Enhancing Life.

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Partnership
For Science & Engineering Practices

Seattle & Renton School Districts; Institute for Systems Biology; UW Engineering & UW Education

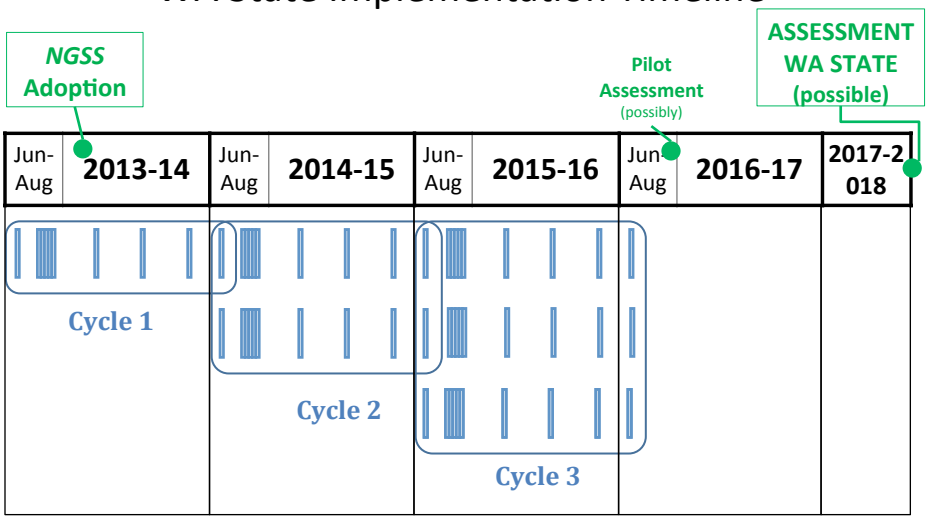
CURRICULUM ADAPTATION PD MODEL

Build capacity with networks of 80-100 teachers per year to teach science kits adapted to support student engagement in NGSS science & engineering practices.

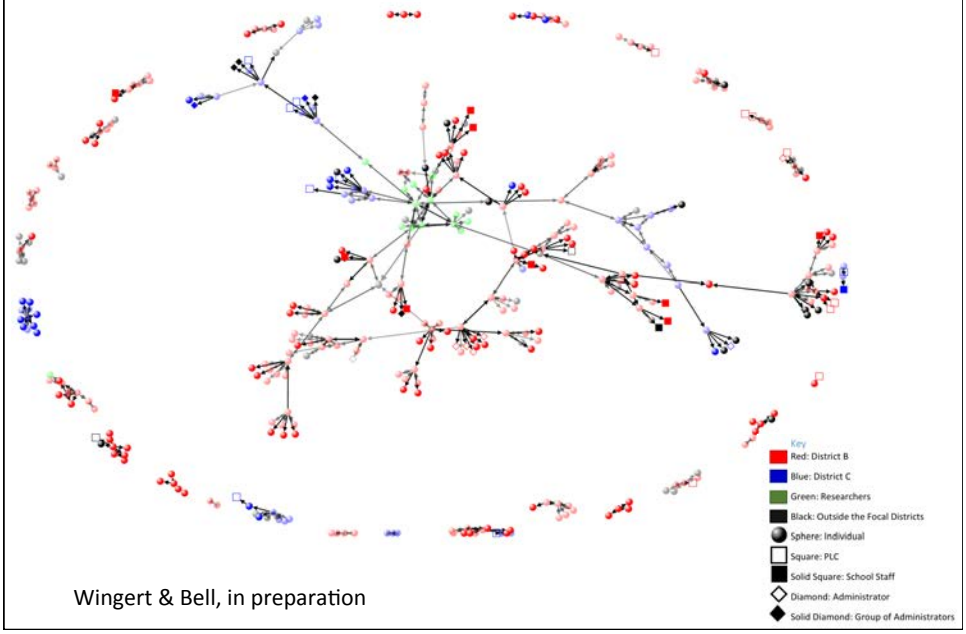
Curriculum adaptation, enactment, and iterative refinement of existing materials—with support—is the educational improvement strategy. Teacher leadership development and resource development / sharing are secondary strategies.

Photos by Institute for Systems Biology, June 2013

Next Generation Science Standards, WA State Implementation Timeline



Sharing Patterns of Teacher Advice Networks



Wingert & Bell, in preparation

Professional Learning Resources to Support NGSS Implementation

- *Co-designed by practitioners & researchers*
- *Tested & refined over time*
- *Easily shareable—over social media, email, paper*

STEMteachingtools.org (web)
@STEMteachtools (twitter)
pinterest.com/stemeducation (pinterest)

Partnership Practices

- How do you learn about the context before engaging in design?
  - Ethnographic fieldwork, Participant interviews & Curriculum walkthroughs
- How do you build relationships with participants?
  - Leadership: strategic long-standing relationships, brokered new relationships, via co-development of the work
  - Teachers: integrate into the work; engage in co-design
- How do you engage in co-design with participants?
  - Leadership: distributed expertise sub-teams, advisory stance
  - Teachers: Observe, co-teach, identify problems of practice, do background research, help with co-design of new pieces

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Partnership Practices

- How do you share research with participants?
  - Member checking; Co-presenting / publishing
- How do you plan for levels of participation?
  - Modest baseline of involvement based on district strategy. Offer 'deep dive' collaborations with interested teachers.
- What happens when participants are resistant to change or go in a direction that you might not think is in the best interest of learners?
  - Shifts in practice often need to be gradual. We offer our perspective and rationale. It is ultimately the decision of practitioners. We theorize why it goes down as it does.

Design Research Partnerships

Principle: Work to Maintain Mutualism

Research-practice partnerships need a commitment to *mutualism*—sustained interaction that benefits both researchers and practitioners (Coburn et al., 2013).

True partnerships between university and school participants are 'symbiotic relationships' exhibiting *mutual interdependence* and *reciprocal benefits* (Goodlad, 1988)

Design Research Partnerships
Principle: Work to Maintain Mutualism

- What organizational routines are in place to help ensure that shifting individual and organizational interests are well aligned in the shared work?
- Intentional strategies: shared governance, periodic renegotiation of the work / MOUs, equitable sharing of resources & project benefits, informal check-ins
- *Discussion: How are you currently maintaining mutualism in the work? Are there things needed to improve it?*

Design Research Partnerships
Principle: Continuous Improvement on Broad Issues within Local Circumstances

Within educational improvement efforts, the work is focused on identifying and working through local 'problems of educational practice' through iterative cycles of design, implementation & analysis (e.g., how does learner choice influence learning)

- Tools, approaches, and findings are broadly applicable but are locally constrained to fit the local context (e.g., culture, infrastructure, routines)
- *Policy Implication: Design-research partnerships can be productively focused on improving existing improvement efforts; the 'tools' must be (re)designed for local use*

Design Research Partnerships

Principle: Partnership Stance & Capacity

Researchers and practitioners needed to be receptive to and capable of engaging in a deep R&D partnership

- Practitioners should hold a collaborative R&D stance, help focus the collaborative work on practice, share their knowledge from practice & refine their practice
- Researchers should be responsive to the context of practice, learn about intersecting implementation initiatives, and develop new technical knowledge as necessary
- *Policy Implication: Need to build human capacity for mutually-beneficial partnership work—as an alternative to the research-to-practice model*

Design Research Partnerships

Principle: Mutually-Beneficial Practices that Leverage Distributed Expertise

Sustained, 'project-focused' collaborations should be cultivated between researchers and practitioners. (The UW-Seattle partnership is in its eighth year.)

- Collaboration actively managed to be mutually-beneficial through shared governance (e.g., Co-PIs), appropriate financial resourcing, and detailed coordination of the work (e.g., around research goals & implementation strategies) while leveraging and building team expertise
- *Policy Implication: Design research partnerships need sustained 'project' funding and networking opportunities with other similar efforts and interested networks*

WHY (RE)NEGOTIATE PROBLEMS WITH PARTNERS OVER TIME?

Individuals bring different understandings of the purposes and key strategies of the partnership.

- *Negotiation can identify commonalties and productive differences.*

Individuals bring different motives for investing their time and energy in the partnership.

- *Negotiation can identify deep motivations for participation that might be addressed.*

Partner organizations' needs and priorities change.

- *After a proposal is developed and starts to be implemented, re-negotiation of the problem can sustain the partnership.*

RESEARCH + PRACTICE COLLABORATORY

exploratorium®

Generative Forms of Partnerships

1. Partner with each other (within and across classrooms, schools, districts)
2. Partner with informal science organizations (e.g. museums, science centers, etc…)
3. Partner with public infrastructure and other science professionals/organizations (e.g. DNR, EPA, NOAA, Parks & Recreation, Public utilities, Professional societies, etc)
4. Partner with researchers and universities.
5. Partner with youth and family serving community organizations
6. Partner with families

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Q&A

Principles for Partnerships

Operating Practices & Tools for Partnerships

Strengths & Challenges for Partnerships

Thank you. To Learn More…

- UW Institute for Science + Math Education
  http://sciencemathpartnerships.org/
- STEM Teaching Tools
  http://STEMteachingtools.org/
- Indigenous Education Tools (Coming in June!)
  http://indigenouseducationtools.org/
- NRC Framework for K-12 Science Education
  http://tinyurl.com/NRCframework/
- Or you can contact us…
  pbell@uw.edu (email) & philiplbell (twitter)
  mbang3@uw.edu (email)