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Symposium at the ORD: 9-6-2011
Introduction and background

- PROO Literature Review: *Examining Research & Development (R&D) in Education*

- Three main forms of R&D distinguished:
  - Design research;
  - Teacher communities; and
  - Research, development, diffusion (RDD)

- Focus: Characteristics and outputs of integrated R&D
Shared analysis framework

- Characteristics of 3 forms of R&D (teacher communities; design research; or rdd), with attention to:
  - Participants involved (e.g. practitioners, intermediaries or researchers);
  - Knowledge used to inform design and development
  - Outputs (e.g. new knowledge, practical contributions)
Methodology

- Search Scopus, WoK and ERIC per model
- Abstract screening: education, R&D, participants, empiricism
- Full text screening: R&D link
- Analysis

Notes:
- Search terms related to ‘R&D models’
- Time span 2008/2009: yield vs. pragmatics
- Research journals as source of information
- Only explicit R&D link
Design research – framework

- Dual goal:
  - Knowledge production
  - Practical solution

- Process characteristics:
  - Interventionist: to improve teaching practice
  - Iterative: multiple cycles of research, development, testing and revision
  - Collaborative: researchers and practitioners involved
Design research – project descriptions

<table>
<thead>
<tr>
<th>Country:</th>
<th>USA (10), China (2), Canada, France, Netherlands, Norway, Singapore, UK</th>
</tr>
</thead>
<tbody>
<tr>
<td>Target:</td>
<td>Primary (7), secondary (3), tertiary (6), professional development (2)</td>
</tr>
<tr>
<td>Content area:</td>
<td>Science (7), math (3), computer science (2), health, language, teaching, history, management</td>
</tr>
</tbody>
</table>
## Design research – participants

<table>
<thead>
<tr>
<th></th>
<th>Teach</th>
<th>Research</th>
<th>Develop</th>
<th>Facilitate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Teacher</td>
<td>• All</td>
<td>• All tertiary-level</td>
<td>• Nearly all: topic, activities, ideas for redesign</td>
<td>• one, within same faculty</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Only three other (limited)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Researcher</td>
<td>• (Unless tertiary-level teacher)</td>
<td>• All</td>
<td>• All</td>
<td>• 2 teachers professional development programs</td>
</tr>
<tr>
<td>Developer</td>
<td></td>
<td></td>
<td>• 2: online environment; math module for upscaling</td>
<td></td>
</tr>
<tr>
<td>Other</td>
<td></td>
<td>• Doctoral students</td>
<td>• Students: choice of topic</td>
<td>• Others (n.s.): learning environment</td>
</tr>
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<td></td>
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</tr>
</tbody>
</table>
Design research – knowledge base

- Development based upon (reported):
  - Literature (11)
    - Usually: ‘adapted’, but hardly specified how
  - project data (15)
  - practical knowledge (6)
    - 6: one knowledge source
    - 2: all three
Design research - knowledge production

- Public knowledge
  - Empirical data (18): user experiences, learning gains, teaching and learning practices.
  - Procedural/declarative (9): design changes and rationales
  - Generalizations (9): principles, theory, lessons learned
- Private knowledge (1): what the participants learned
- Dissemination:
  - Journals, thesis (12)
  - Project website (3), meetings & conferences (3)
Design research – Conclusions

- Large variety in topics and level
  - Usually up to 5 teachers, up to 3 researchers

- Teachers and researchers: designing collaboratively
  - Few professional developers involved
  - Teacher-researchers: in tertiary education
  - Other teachers: little involvement in knowledge construction & dissemination

- Little room for detailing design choices, changes and theory
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TEACHER COMMUNITIES
Teacher communities – Framework

- TC as an *overarching concept* (PLC, inquiry communities, CoP, action research)

- Two generic goals:
  - *Improve practice* (and hence student learning)
  - *Professional development* (use/share/generate knowledge)

- Underlying assumptions:
  - Teachers are “producers or mediators” of knowledge (Richardson, 1994)
  - R-P connections are not unidirectional, but reciprocal and intricate

- Various activities

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## Teacher communities – Project descriptions

<table>
<thead>
<tr>
<th></th>
<th>Content-based professional development projects</th>
<th>Inquiry-based professional development projects</th>
<th>Action research projects</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Goal:</strong></td>
<td>Support the implementation of an instructional framework</td>
<td>Engage teachers in systematic inquiry</td>
<td>Address a specific problem identified in teachers’ practice</td>
</tr>
<tr>
<td><strong>Country:</strong></td>
<td>USA / Canada</td>
<td>USA / Canada</td>
<td>Varied (Cyprus, New Zealand, Canada, Greece, Spain)</td>
</tr>
<tr>
<td><strong>Target:</strong></td>
<td>In-service Primary school teachers</td>
<td>In-service Secondary school teachers</td>
<td>(mostly) Primary school teachers</td>
</tr>
<tr>
<td><strong>Content area:</strong></td>
<td>Science / literacy</td>
<td>Maths/Science/Literacy</td>
<td>Inclusive education/maths/science</td>
</tr>
<tr>
<td><strong>Number of TC involved:</strong></td>
<td>More than one</td>
<td>More than one</td>
<td>One</td>
</tr>
</tbody>
</table>
Teacher communities – Participants

- **TEACHERS**
  - DESIGNER
  - LEARNER
  - RESEARCHER

- **UNIVERSITY RESEARCHERS**
  - RESEARCHER
  - DESIGNER OF PD
  - FACILITATOR

- **SCHOOL SUPPORT**
  - (E.g., science coordinator, resource teachers, principal, etc.)
  - FACILITATOR

- **CONTENT EXPERTS**
  - (E.g., science Ph.D. students, experienced teachers, etc.)
  - Teacher Educator / FACILITATOR

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Teacher communities – Knowledge base

FORMAL KNOWLEDGE  
Design of instructional solutions  
(e.g., Lessons, pedagogic strategies, materials)

KNOWLEDGE GENERATED THROUGH INQUIRY  
(Classroom data)

PRACTICAL KNOWLEDGE
Teacher communities – Knowledge base

Orientation 1:

- Formal Knowledge
- Practical Knowledge

Orientation 2:

- Practical Knowledge
- Teacher Inquiry

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Teacher communities – Knowledge (re-)creation

- Nature of findings reported:
  - Case studies – Unit of analysis: individual teachers / community
  - (Mostly) University researchers’ perspectives on the TC
  - Findings tightly bound to the context and presented as “lessons learned”
  - Themes: contributions of PD or AR to teacher learning / practice

- Initiatives for dissemination outside the TC *(mostly in PD projects)*:
  - Academic circuit: scientific publications/ conferences
  - Professional circuit: school presentations / professional conferences
Teacher communities - Conclusions

- Nature of R-P connections revealed rich variations across projects.

- The facilitator role (adopted by university researchers or content experts) is central for strengthening R-P connections.

- The two orientations identified might be limited by the emphasis they give to teacher knowledge over teacher inquiry or vice-versa.

- (Surprisingly) the role of teachers as co-constructors of knowledge and theorizers is not discussed.
RESEARCH, DEVELOPMENT, DIFFUSION

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RDD – Framework

- **Research**
  - Aims at advancing knowledge.
  - Provides the basis for an innovation.

- **Development**
  - **Design**: Translation of research knowledge into an educational solution suitable for use.
  - **Evaluation/testing**: feasibility, generalizability, performance

- **Diffusion**
  - **Dissemination**: spread the innovation, create awareness
  - **Adoption**: trial, installation and institutionalization
### RDD – Project descriptions

<table>
<thead>
<tr>
<th></th>
<th>Model/Guideline projects</th>
<th>Health promotion projects</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Goal:</strong></td>
<td>Assist teachers in the design of instructional activities.</td>
<td>Prevent eating disorders / Promote physical activity</td>
</tr>
<tr>
<td><strong>Country:</strong></td>
<td>USA / Canada / Netherlands</td>
<td>USA / Netherlands / Germany</td>
</tr>
<tr>
<td><strong>Target:</strong></td>
<td>University programmes</td>
<td>Primary schools</td>
</tr>
<tr>
<td></td>
<td>High schools</td>
<td>Pre-schools</td>
</tr>
<tr>
<td><strong>Content area:</strong></td>
<td>Varies (Cartography, pediatric residency, mathematics)</td>
<td>Physical Education</td>
</tr>
</tbody>
</table>
RDD – Participants

**RESEARCHERS**
- **Co-design** the educational solution.
- **Assess** the quality, utility, feasibility and effectiveness of the educational solution.
- (Sometimes) Act as **trainers** or **facilitators**.

**CONTENT SPECIALISTS**
- Assist in the **design** process.
- Assist with **data collection**.
- Provide **advice** to teachers during implementation.

**TEACHERS**
- Contribute to the **design** process (feedback).
- **Implement** the educational solution designed by the project team.
- (Sometimes) Assist with **dissemination**.
# RDD – Knowledge base informing design

<table>
<thead>
<tr>
<th>Educational Model/ Guidelines</th>
<th>Author</th>
<th>Sources informing the design of educational solutions</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Research literature</td>
<td>Data from needs assessment</td>
</tr>
<tr>
<td>Balram &amp; Dragicevic</td>
<td>△</td>
<td>△</td>
<td>△</td>
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<tr>
<td>Kittredge et al.</td>
<td>△</td>
<td>△</td>
<td>△</td>
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<tr>
<td>Stone, Alfed &amp; Pearson</td>
<td>△</td>
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<td>Mooij</td>
<td>△</td>
<td></td>
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<tr>
<td>Prevention/Health promotion program</td>
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<td></td>
<td></td>
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<tr>
<td>Berger et al.</td>
<td>△</td>
<td></td>
<td>△</td>
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<tr>
<td>Jurg, et al.</td>
<td>△</td>
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<td>△</td>
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<tr>
<td>Jansen et al.</td>
<td>△</td>
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<tr>
<td>Carlson et al.</td>
<td>△</td>
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<tr>
<td>Williams et al.</td>
<td>△</td>
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</tbody>
</table>

△ Explicitly acknowledged influence in the design process  • Highly probable influence in the design process
RDD – Adoption, implementation & dissemination

TEACHER OWNERSHIP
- Involvement in design activities (proactively or reactively)

PROFESSIONAL DEVELOPMENT
- Workshops, coaching, demonstration, exemplary materials

AWARENESS
- School meetings, newsletters, walking interventions
RDD – New knowledge production

- The nature of the findings reported varies depending on the *stage of the development process* (e.g., pilot implementation, effectiveness study, dissemination).

- Overall, findings are mainly concerned with the utility, adequacy and feasibility of the educational solution.

- (Usually) considerations about further dissemination and/or scaling up are addressed.
RDD – Conclusions

- Most projects were conceived from the mindset of working at scale.
- In most cases, multidisciplinary teams were involved in the development process.
- Projects spent (at least) 2 years in the development process.
- Data from needs assessments and pilot studies was usedformatively to refine the intervention.
GENERAL CONCLUSIONS
Conclusions

- **Participants: Multiple roles**
  - Teachers: (co-) designers, researchers, implementers...
  - Researchers: designers, teacher educators, facilitators...
  - Content experts / Specialists: (co-)designers, facilitators....
  - Multi-disciplinary teams strongest in RDD, then DR, then TCs

- **Knowledge informing design:**
  - almost all use (research) literature; most use project data; Many use practical expertise

- **New knowledge production:** primarily public in DR (but often also local); primarily local in TCs; mostly limited to effectiveness and conditions for dissemination in RDD
Thank you!

Now let’s hear what our discussants and audience have to say about all this…