Implementing Innovative Learning Environments Using Design-Centric Research-Practice Partnerships: Citizen Science as a Context
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Rationale
Advancing educational change is a practical challenge for both academy and field (Coburn & Penuel, 2016). In recent years, there is a growing interest in Design-Centric Research-Practice Partnerships (DC-RPPs) as a means to cope with this challenge. DC-RPPs are multifaceted collaborations between researchers and practitioners aimed at designing and implementing new learning solutions (Coburn et al., 2013; Kali et al., 2018). However, engaging in such partnerships introduces difficulties (Penuel et al. 2015; Sannino et al., 2016).

- Intersecting Communities of Practice
- Different ideas, perspectives, and practices
- Varied commitment towards forming a change

What strategies can support productive DC-RPPs?
Researchers act as a responsive partner

The exploration of strategies that support productive DC-RPPs is still in its infancy (Akkerman & Bruining, 2016; Mckenney, 2016; Kali et al., 2018).

Research Goal and Theoretical Lenses

Research Goal
To expand the theoretical and practical knowledge of strategies that can support productive DC-RPPs, in the context of Citizen Science (CS) based innovative learning environments.

Theoretical Lenses
Integrating theoretical lenses:
Strategies that have been explored in the context of DC-RPPs, along with unexplored ones.

- Developing personal mastery
- Encouraging team learning
- Working in multiple organizational levels
- Nurturing the role of a boundary crosser
- Applying boundary objects

Organizational Learning (Senge, 1990)
An organizational theory that concerns with becoming a learning organization

Methodology
Design-based implementation research (DBIR): a methodology that uses iterative interventions to improve design as well as test theoretical conjectures (Kali & Headley, in press).

Action/reaction timeline: a data analysis methodology in which practitioners’ and researchers’ learning is interpreted as action-reaction progressive developments (Kali et al., in press).

Research Description
Three DC-RPPs were established in three different schools. The DC-RPPs’ main objective:
Develop and implement a CS-based learning environment, involving students in data collection and analysis of a scientist-led research.

1st Iteration (School A) | 2nd Iteration (Schools B, C)
Scientific research | Identifying jellyfish distribution patterns | Monitoring mammal populations using footprints
No. of teachers | 4 | 3
Students’ grade | 4th and 5th (~60 students) | 4th grade (~70) 9th grade (~60)

Intervention (1st Iteration) | Interpretation and Extrapolation | Intervention (2nd Iteration)
Applying DC-RPPs supporting strategies | Data Analysis: Action/Reaction timeline | Applying Revised DC-RPPs supporting strategies

Preliminary Findings

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<th>Strategies to support DC-RPPs</th>
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| Developing personal mastery | Action: teachers experience difficulties and hesitations adjusting to new teaching practices and ideas | • Gradation in the introduction of new practices  
• Providing scaffolding as a basis for co-design | • Providing pre-built learning modules to the teachers while assessing the suitable level of innovation  
• Setting the DC-RPP as a sandbox for experimenting with new practices and tools for both teachers and researchers |
| Reaction: research-team adds scaffolds by offering several pre-designed learning materials for the practitioners | Reaction: research-team creates a DC-RPP online messaging group while encouraging collaborative discourse  
• Using online collaborative tools from start, to make it a partnership norm  
• Encouraging an open and transparent relationship between all partners | Creating multiple online messaging groups and a joint online folder with the DC-RPPs’ artifacts for collaborative use along the process  
Researchers taking a proactive communicating role while encouraging others to do so as well |

| Applying boundary objects | Action: a lack in teachers’ responsiveness and in collaborative working habits | • Using online collaborative tools from start, to make it a partnership norm  
• Encouraging an open and transparent relationship between all partners | Creating multiple online messaging groups and a joint online folder with the DC-RPPs’ artifacts for collaborative use along the process  
Researchers taking a proactive communicating role while encouraging others to do so as well |

Boundary Crossing (Akkerman & Bakker, 2011; Akkerman & Bruining, 2016)
A sociocultural theory that describes how boundaries can facilitate learning between communities

New Integrated strategies to support DC-RPPs
- Developing personal mastery
- Encouraging team learning
- Working in multiple organizational levels
- Nurturing the role of a boundary crosser
- Applying boundary objects

Revised Strategies

- Iteration (1st)
- Iteration (2nd)