Reflective Practice in Preschool Science Teaching and Learning -- PreSTAR

[a]Soo-Young Hong, PhD, [a]Erin Hamel, [a]Anna Burton, [a]Yuenjung Joo, [b,c]Gisela Wajskop, PhD, [c]Patricia Pastorello, & [c]Débora Maclean

[a]Department of Child, Youth and Family Studies; University of Nebraska-Lincoln, USA
[b]Pontifícia Universidade Católica de São Paulo, Brazil [c]Escola do Bairros, São Paulo, Brazil

INTRODUCTION

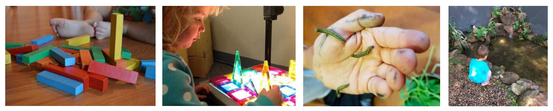
- Science provides children with the opportunity to develop knowledge about their everyday interactions with their environments and build scientific problem-solving skills (Bredekamp & Rosegrant, 1995).
- Science-related conversations help children learn to reason and understand their own thought processes, which are important steps toward metacognition and self-regulation of learning (Kirsch, 2007).
- Science supports children's learning across multiple school readiness domains (Nayfeld et al., 2011). However, at kindergarten entry, children's science readiness is lower when compared to other content areas like reading and math (Greenfield et al., 2009).
- Most of preschool teachers' experiences are limited to demonstrations, and they attribute their hesitation to implement science activities to their lack of content knowledge (Torquati et al., 2013).
- To create meaningful changes in teacher practices related to science, a professional development approach incorporating reflective practice is needed, so that teachers can make greater impacts on children's learning (Greenleaf et al., 2011; Osterman & Kottkamp, 2004)..

AIMS

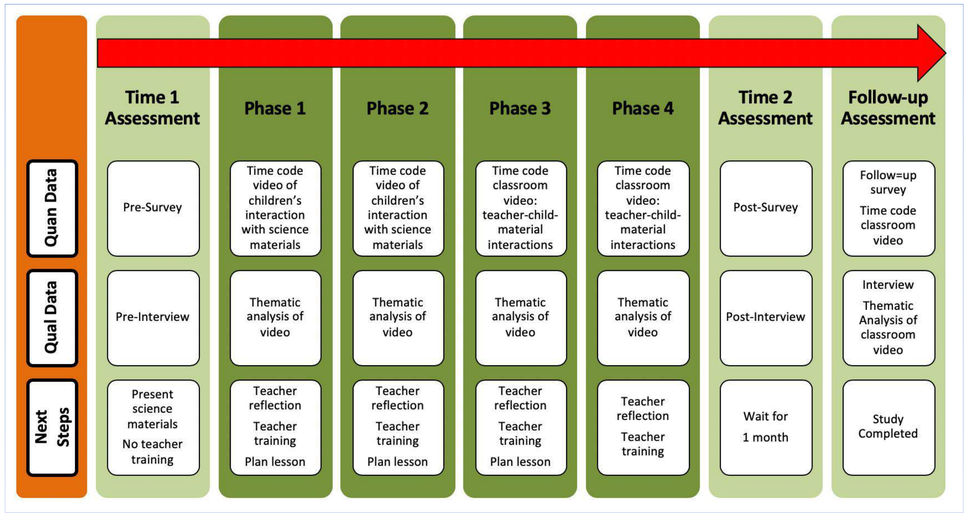
- To investigate preschool teachers' ideas about incorporating science concepts and practice in their classroom teaching in the US and Brazil.
- To examine how the level and the focus of teachers' reflection change over the course of a four-session professional development in the US and Brazil.

METHOD

- **Design**: Multi-Phase Mixed Methods Design (Plano Clark & Ivankova, 2016).
- **Participants**: 6 preschool teachers serving 4- and 5-year-old children mostly from low income families (2 teachers in Brazil; 4 teachers in the US).
- **Teacher Survey (pre and post)**: their attitudes towards science (Maier et al., 2013), their classroom environment related to science (Tu, 2006), and their reflections about teaching science.
- **Teacher Interview (pre and post)**: further explanation as to their own practices around science topics in their classroom
- **Reflection Sessions (4 sessions)**: teacher narrations and reflections of videotaped interactions and observations (**Focus**: physical science – the US; life science – Brazil)

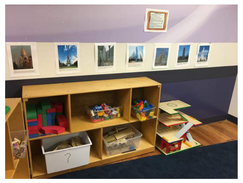


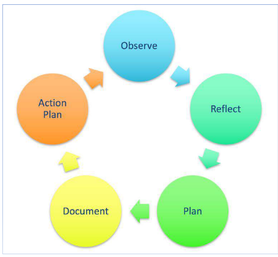
PROFESSIONAL DEVELOPMENT FRAMEWORK and PROCEDURE

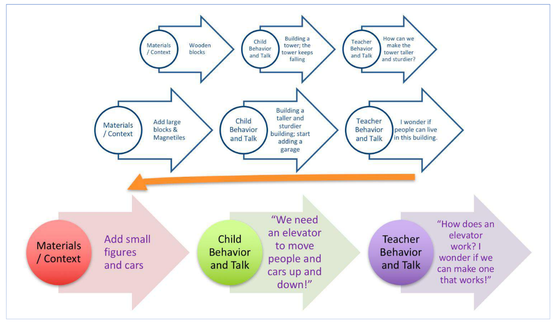


Contents discussed in reflection meetings include:

- **Teacher Talk** (Hong & Hamel, 2017)
- **Lesson Planning** (adapted from Erikson Institute, 2014)
- **Cycle of Inquiry** (adapted from Gandini & Edwards, 2001)
- **Inductive Thinking Framework** (PreSTAR, 2018)







PRELIMINARY FINDINGS

TIME 1 TEACHER PRACTICES

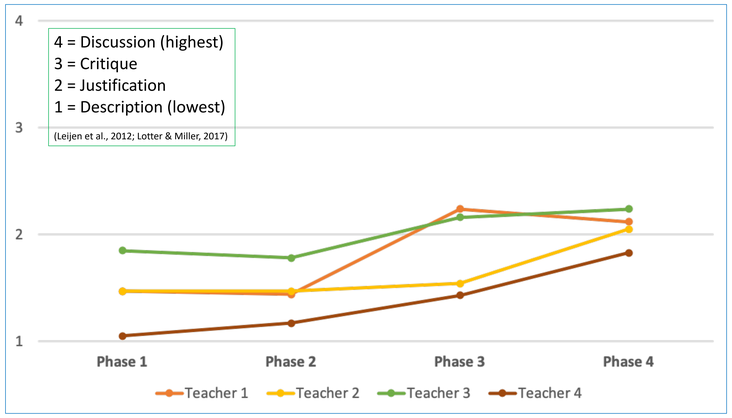
	Planning for Science	Brazil	US
1	Plan science activities around a specific theme		✓
2	Use the ***internet*** to gather ideas for planning	✓	✓
3	Use curriculum to plan science activities		✓
4	Use the ***child's interests*** to plan science activities	✓	✓
5	Talk with ***educational coordinator*** about ideas for science in the classroom	✓	✓

	Curricular Approach	Brazil	US
1	***Set curriculum and/or guidelines***	✓	✓
2	Planned experiments		✓
3	Spontaneous	✓	
4	According to child's interest	✓	
5	School's political, pedagogical project	✓	

	Challenges	Brazil	US
1	Finding themes	✓	
2	***Lack of materials***	✓	✓
3	Training for teachers	✓	
4	Teachers' lack of confidence		✓
5	Teacher to child ratio	✓	

MEAN LEVEL OF TEACHER REFLECTION

Level of Teacher Reflection across Phases (US, 4 teachers, 437 excerpts)
Statistically significant difference across phases (i.e., Phase 4 > Phases 1, 2, 3)



Level of Teacher Reflection across Phases (Brazil, 2 teachers)
Qualitatively analyzed differences across phases

Higher-level Reflections on…	Illustrative Quotes or Examples
Respect for children's actions and ideas	"When he is not behaving properly, take a deep breath and say 'No, this child is a researcher' […] Oh my gosh, it is beautiful, it's a sensitive child, […] he is not aggressive, he just wants to stay in nature."
Critical evaluation of their own practices and interactions with children	"I stopped and thought, 'I think I want to investigate with children because, in the past, I've done an experiment in which I discovered with the child. It was much more interesting, more enjoyable when we discover together."
Role of materials in prompting children's science investigations	A teacher described the importance of allowing children to explore materials on their own (e.g., magnifying glasses, measuring tools, seeds and plants) and helping them come up with questions while interacting with the materials and environment (vs. making experience adult-directed all the time).

DISCUSSION

TEACHER PRACTICES

- Between the **US** and **Brazil**, more similarities were found in how teachers plan for science activities than differences.
- Set curriculum and/or guidelines exist in both contexts; however, how teachers actually initiate and implement science activities seems to be different between the **US** and **Brazil**.
- Teachers in **both countries** discussed that science materials involve various materials specific to scientific experiments.

TEACHER REFLECTION

- **US**: Although teachers provided significantly deeper level of reflection as they participated in more reflection sessions, the overall level of reflection was low (*M*=1.67).
- **Brazil**: Overall, teachers provided lower-level reflection (Description). However, they provided more child-centered reflection (vs. adult-centered reflection) as more science-related materials become available.
- The **focus** of reflection seems to impact the **level** of reflection, but the relationship seems to differ between the two countries. Further analyses will be conducted on this topic (e.g., **US**: Higher level reflections focused on children and teachers' thinking away from materials and towards a focus on children and teacher behaviors).

FUNDING and CONTACT

Funding for this project was provided by the **University of Nebraska-Lincoln** and the **Fundação Maria Cecilia Souto Vidigal** (Foundation) through its collaborative Pilot Impact Program. Opinions expressed herein are those of the authors and do not reflect the position of the University of Nebraska or Foundation.

Contact: Soo-Young Hong, PhD. (shong5@unl.edu)