Reflective Practice in Preschool Science Teaching and Learning -- PreSTAR

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 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 further explanation as to their influence on the children.

PROFESSIONAL DEVELOPMENT FRAMEWORK and PROCEDURE

TEACHER PRACTICES

- Planning for Science: Brazil, US
- Use the internet to gather ideas for planning: ✓ ✓
- Use curriculum to plan science activities: ✓ ✓
- Use the child’s interests to plan science activities: ✓ ✓
- Talk with educational coordinator about ideas for science in the classroom: ✓ ✓

MEAN LEVEL OF TEACHER REFLECTION

Level of Teacher Reflection across Phases (US, 4 teachers, 437 excerpts)

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<th>Phase</th>
<th>US</th>
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Higher-level Reflections on...

- 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 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).

Preliminary Findings

- Statistical significance difference across phases (i.e., Phase 4 > Phases 1, 2, 3)
- Qualitatively analyzed differences across phases

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.
- 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).

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