There is concern about how science is taught in U.S. schools (NRC, 2007) and significant interest in developing science skills during the preschool years (Greenfield et al., 2009; NRC, 2007). A number of preschool curricula that use science as their foundational element are being developed (e.g., French, 2004; Gelman & Brenneman, MacDonald, & Roman 2010). However, recent reviews of early childhood assessment in general (Snow & Van Hemel, 2009) and science in particular (Brenneman et al., in press) document the lack of valid and reliable early science assessments. One study, for example, relied on the PPVT for assessing the effectiveness of their preschool science curriculum (French, 2004). Other early science interventions have used assessments directly linked to the intervention (e.g., Gelman et al., 2010; Gropen, Clark-Chiarelli, & Hoisington, 2006 Samarapungavan, et al., 2007; Witt & Kimple, 2006). Measures of preschool children’s science abilities that are not directly tied to a specific curriculum are needed to evaluate science-based curricula and interventions, but currently there are none available.

We first describe the development of an 80 item Rasch-based flip-book direct assessment of preschool children’s science abilities that followed the guidelines for measurement development from the Standards for Educational and Psychological Testing (AERA, APA, & NCME, 1999). The Science Direct Assessment (SDA) was based on a blueprint covering three broad science content areas (Life Science, Earth and Space Sciences, and Physical and Energy Sciences), as well as eight process skills (Observing, Describing, Comparing, Questioning, Predicting, Experimenting, Reflecting, and Cooperating). Reliability and validity data collected with the SDA will also be reported demonstrating both high person reliability (.93) and item reliability (.98), predictable correlations with related measures, growth in science ability across the preschool school year and sensitivity to detect the positive impact of a classroom based preschool science intervention.

Current extension of this work to develop an adaptive version of the assessment (Lens on Science) using a computer tablet with touch screen technology will also be presented. This includes discussion of the advantages of our approach, software solutions for item employment, the development of a readiness screener integrating demonstration video and the practice of requisite skills and preliminary data using the system with low-income preschool children.

References


