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Parents who want their PreK children to have science learning experiences are outliers

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ABSTRACT

The purpose of this study was to examine parental priorities regarding science education in the early years. The study sample included 1456 Turkish parents of pre-K children (36–72 months). Parents were asked to prioritize eight academic content areas, including science, in descending order. The results demonstrated that the number of parents who prioritized science over other academic content areas in pre-K classrooms was quite low. Parents who ranked science highly deviated from the whole sample and almost all of these parents were identified as outliers by the two-step cluster analysis. Parents of boys and younger children and parents with high-SES level were more likely to prioritize science over other academic content areas. The findings suggest that parental preferences overall align well with early childhood teachers' tendency to teach less science than other content areas, and parental priorities might be another major factor that contributes to limited science learning experiences in the early years.

1. Introduction

Science education in early childhood classrooms has been largely under represented in preschool curricula and early learning experiences. Children have fewer opportunities to learn science than literacy, mathematics, social studies, and arts in typical early childhood classrooms (Bracken & Fischel, 2006; Early et al., 2010; Greenfield et al., 2009; Nayfeld, Brenneman, & Gelman, 2011; Saçkes, Trundle, Bell, & O'Connell, 2011; Varol, 2013). Most early childhood teachers teach science only once or twice per week, resulting in very limited time for science learning (Saçkes et al., 2011) and teachers tend to focus on teaching life science concepts more than physical and earth and space science concepts (Saçkes, in press).

The reasons for the limited visibility of science learning experiences in early childhood classrooms to date have been examined solely from the teacher's perspectives. These studies have identified several factors that prevent early childhood teachers from providing effective science learning experiences for young children. Studies have demonstrated that several factors influence early childhood teachers' decisions to devote less time in teaching science in their classrooms. These factors include: (1) limited science and pedagogical content knowledge (Appleton, 1992; Kallery & Psillos, 2001; Saçkes, in press), (2) pressure to teach content areas other than science (Greenfield et al., 2009; Nayfeld et al., 2011), (3) limited availability of science-related materials (Appleton & Kindt, 1999; Early et al., 2010; Greenfield et al., 2009), (4) perceptions that young children are incapable of learning science concepts (Fleer, 2009; Saçkes, in press), (5) and low teacher self-efficacy for teaching science (Appleton, 1995; Garbett, 2003; Greenfield et al., 2009; Kallery & Psillos, 2001; Maier, Greenfield, & Bulotsky-Shearer, 2013; Nayfeld et al., 2011; Pell & Jarvis, 2003).

An increasing number of studies have examined how often early childhood teachers teach science concepts and the factors that influence teachers' decisions to teach science in the early years (Saçkes, in press). Studies suggest that parental support for science learning in school and at home promotes children's interest in science and conceptual understanding of scientific phenomena (Alexander, Johnson, & Kelly, 2012; Mantzicopoulos, Patrick, & Samarapungavan, 2013; Tenenbaum, Snow, Roach, & Kurland, 2005). Positive experiences with learning science in school might influence parents' beliefs about teaching and learning science in the early years. Parents with affirming learning experiences might have a positive attitude toward learning science and have the resources to support their own children's learning of science (Chen, 2001; Dierking & Falk, 1994; Ferry, Fouad, & Smith, 2000; George & Kaplan, 1998; Kaya & Lundeen, 2010; Zady & Portes, 2001). Parents' beliefs about the importance and appropriateness of learning science may influence the quality and the quantity of science learning opportunities children receive at home and in school. However, parents' perceptions of the importance of science learning in comparison to other academic content areas have not been examined in the literature. Therefore, the current study aims to fill the gap in the literature via examining parents' preferences for learning science

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in early childhood classrooms compared to other academic content areas.

1.1. Parents' priorities for preschool and kindergarten curriculum

Parental priorities for early childhood curriculum have been extensively studied in the literature. For example, the findings of the studies conducted in Hong Kong, Australia, and U.S. have demonstrated that parents are more likely than early childhood teachers to focus on academic learning (Dockett & Perry, 2004; Ebbeck, 1995; Knudsen-Lindauer & Harris, 1989). More specifically, parents are inclined to rank reading, writing, and mathematics as being more important than do teachers of young children (Hewitt & Maloney, 2000; Knudsen-Lindauer & Harris, 1989). American fathers tend to emphasize academic learning more than mothers and parents' academic expectations for girls were found to be higher than boys (McBride & Ferguson, 1992). Parents of older preschoolers tend to perceive academic skills as more important than the parents of younger preschoolers in Hong Kong (Fung & Cheng, 2012). Likewise, parents with low socioeconomic status and minority parents tend to focus more on academic learning than non-minority parents and those of higher socioeconomic statuses (Evans & Fuller, 1998; Harding, 2006; Kernan & Hayes, 1999; Ojala, 2000; Piotrkowski, Botsko, & Matthews, 2000). Researchers also have identified cross-cultural differences in parents' expectations and priorities. For example American, Chinese, Malaysian, and Irish parents of pre-K children tend to focus more on academic learning than Swedish, Finnish, Icelandic, and Japanese parents (Einarsdóttir, 2010; Hewitt & Maloney, 2000; Ojala, 2000; Tobin, Wu, & Davidson, 1991). Children's acquisition of moral and ethical values and behaviors also is considered as an important educational goal in the early years (Brownlee et al., 2012; LePage et al., 2011; Luo, Tamis-LeMonda, & Song, 2013). Turkish parents expect their children to acquire moral values early in their lives (Nacak, Yağmurlu, Durgel, & van de Vijver, 2011). The findings of a recent study with Turkish parents of preschool age children demonstrated that a majority of the parents expects schools to provide systematic moral education in preschool classrooms (Balat, Beceren, & Özdemir, 2011).

Although parents of pre-K children perceive social and emotional development as important areas to be targeted in early childhood classrooms, they tend to favor cognitive development and related academic skills more than other areas. Even parents who report that their children's social emotional development is the primary reason that they send them to preschool tend to prefer activities that support academic learning in pre-K classrooms, and they perceive academic and cognitive development as the primary outcomes of preschool education (Hewitt & Maloney, 2000).

In studies that examine parents' expectations and priorities for early childhood programs, reading, writing, and mathematics are the only academic skills parents are typically asked to rank or rate among a list of other skills (Kernan & Hayes, 1999; Knudsen-Lindauer & Harris, 1989). No previous studies included science as an option for parents to consider or examined how parents prioritize science among other academic content areas. The findings of only one recent study provide a glimpse of what parents might think about the place of science learning in early childhood curriculum. While the literacy and mathematics activities were the most preferred learning experiences parents wanted for their children, activities that have a potential to promote scientific thinking such as sand play and water play were the least preferred activities by the Malaysian parents surveyed in that study (Hewitt & Maloney, 2000).

Greenfield et al. (2009) suggested that preschool science education is an emerging research area and basic studies that provide preliminary empirical data should be conducted. These researchers suggest that future research in this area should focus on understanding the reasons science is not targeted in early childhood classrooms and propose that teacher-related variables, such as self-efficacy and time-constraints, and developing instruments to assess preschool science readiness and quality should be major research topics (Greenfield et al., 2009). A neglected factor in this proposed research agenda is an examination of parents' expectations and priorities for science in early childhood programs. Although early childhood teachers' beliefs, their classroom practices, and the child-related factors are important components, parental involvement, expectations, and priorities regarding science education in the early years should also be included in such an agenda (Ginsburg & Golbeck, 2004).

1.2. Early childhood science education

A large body of literature provides evidence that children develop ideas, although mostly divergent from scientific accounts, about how the natural world works very early in their lives. For example, studies revealed that children have naïve ideas about night and day cycle, the shape of the earth, the moon phases, distinction between living and nonliving things, properties of physical objects, light and shadows, and the mechanism of rainfall (Carey, 1985; Hannust & Kikas, 2007; Hobson, Trundle, & Sackes, 2010; Krnel, Watson, & Glazar, 2005; Saçkes, Flevares, & Trundle, 2010; Segal & Cosgrove, 1993; Venville, 2004; Vosniadou & Brewer, 1992; Vosniadou & Brewer, 1994). Collectively, findings from these studies demonstrated that even preschoolers come to school with intuitive understandings of various natural phenomena. Therefore, researchers suggest that educational experiences for young children should take their prior knowledge into account and provide opportunities to help children in restructuring and constructing their conceptual understandings of science phenomena (Harlen, 2001; Osborne & Freyberg, 1985; Trundle & Saçkes, 2012; Vosniadou, Ioannides, Dimitrakopoulou, & Papademetriou, 2001).

Science education in early childhood classrooms should provide opportunities for children to develop their scientific thinking skills, conceptual understanding of natural phenomena, and positive attitudes toward science (Saçkes et al., 2011; Trundle & Saçkes, 2012). Studies suggest that children's understanding of science concepts and their scientific thinking skills develop successively (Duschl, Schweingruber, & Shouse, 2007; Hmelo-Silver & Duncan, 2009). Early exposure to developmentally appropriate science learning opportunities may promote children's learning of more advanced science concepts and inquiry skills in subsequent years (Saçkes et al., 2011; Tao, Oliver, & Venville, 2012) and help children develop positive attitudes toward science (Mantzicopoulos, Patrick, & Samarapungavan, 2008; Patrick, Mantzicopoulos, & Samarapungavan, 2009), which is linked to later science achievement and STEM-related career choices (Maltese & Tai, 2010; Osborne, Simon, & Collins, 2003).

Contemporary science education literature emphasizes inquiry-based instruction as one of the most effective ways to promote conceptual understandings of scientific phenomena (Anderson, 2002, 2007; Trundle & Saçkes, 2012). Inquiry-based instruction with Pre-K children takes children's existing conceptual understanding into consideration and includes hands-on activities with sense-making discussions where children are encouraged to be physically, mentally, and emotionally active (Saçkes et al., 2011). Inquiry-based instruction with Pre-K children should involve developmentally appropriate structuring and scaffolding such as in formulating research questions and procedures to reduce the amount of cognitive load that may restrain children from constructing conceptual understandings and developing science process skills (Mayer, 2004; Nayfeld et al., 2011; Peterson & French, 2008; Trundle & Saçkes, 2012). In such a learning environment, children