



Research to Practice Article

Taking Science Home: Connecting Schools and Families through Science Activity Packs for Young Children

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Taking science home: Connecting schools and families through early childhood science activity packs

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Overview

This study focused on the use of take-home family science activity packs designed to encourage families to engage in scientific inquiry, support meaningful discourse, and encourage critical thinking. This research included two phases: (1) a self-report phase in which 27 families from six different early childhood classrooms (PreK-3) completed paper surveys about their use of the family science packs; and (2) a video-case phase at a local science museum that documented five families exploring the family science packs. The context for this research is a large-scale science project for teachers and families of young children (PreK-3) funded by a grant from the National Science Foundation (NSF).

Twenty family activity packs were created (one each quarter) for five different grade levels (PreK, Kindergarten, 1st, 2nd, and 3rd). The family packs, sent home by teachers, contained science inquiry activities that were aligned with the science and engineering practices in the Frameworks (NRC, 2012), Ohio Early Learning Standards (Ohio Department of Education [ODE], 2012), and Ohio Content Standards (ODE, 2011). Each pack included a newsletter with the directions for the science

investigation, necessary materials for the activity, and a journal sheet that children used to visually represent understanding.

Research Topic/Questions

This descriptive study addresses the lack of opportunities that young children have to participate in science, particularly with their families, and the prospect of family take-home science packs as an intervention to fill this void. This study examined four research questions:

1. Do parents who are high participants in (two or more) informal science community events use family science activity packs differently than parents who are typical participants in (one or less) informal community events?
2. How do parents' questions and comments align with those suggested in the family activity packs?
3. How do children's inquiry behaviors during the family science activities align with those outlined in the activity packs?
4. What is the nature of parent and children's reactions to the science activity packs?

Discussion of Findings

The parent survey revealed that 100% of parents would recommend some, or all, of the science family packs to other parents, and they were interested in

finding other science related activities to do with their child(ren). However, we also found that only 53.85% of the parents felt very confident in knowing where to find other science activities for their child(ren), indicating a need for assistance in this area. In addition, the data showed that all parents found most of the instructions easy to follow, that the child(ren) enjoyed all, or most, of the packs and that the child(ren) learned something from the packs. Many of the parents also enjoyed the packs and learned something from them as well. Nearly 96% of families reported an increase in their child(ren)'s interest in science after completing the activity packs. Of the surveys returned, 51.85% of them came from "typical" families and 48.15% came from the "high attending" families. A small difference was found when examining whether the family packs spurred further scientific investigations at home. Families who attended two or more community events were more likely to state that the family pack activities spurred additional investigations (59%) than families who attended only one community event (20%).

In the video-case phase, we found that families implemented many of the designed and intended inquiry behaviors, while several packs elicited more inquiry behaviors than they were originally designed to elicit. However, we discovered that families self-reported a much higher incidence of asking their child(ren) more open-ended questions than closed during the science family pack activities than was observed during the video-case study. In fact, the videotaped parents tended to ask more questions that were closed and literal, and they rushed toward a "correct" answer. In addition, the high number of close-ended questions limited the discourse between parent and child as the parent often asked multiple questions in rapid succession and the child typically answered the final question in the series with a single word answer. This suggests that parents need to be taught how to ask high quality questions. We also calculated that the parents in our study waited an average of 2.02 seconds before asking another question or providing their children with the answer. This suggests that if parents were educated about the

importance of wait-time and began to incorporate it into their discussions with the children, the child's responses to the questions asked during the family packs would likely become longer and more complex.

Implications for Practice

The positive response from families suggests that the family science packs have the potential to provide valuable inquiry experiences and serve as a model for meaningful science instruction that links school-based science with family activities. Based on this study we recommend the following to further increase the family learning potential of family science activity packs and connections to the classroom.

Connecting School Science to Home. These science activity packs need to be aligned with what the students are experiencing in the classroom and provide students an additional context for science learning to occur. The artifacts produced from these science activities can then be used within the classroom to reinforce the science learning goals identified by the educator. For example, data collected by students can be brought back to the classroom and then compiled, analyzed and interpreted by the entire class. The family science activity utilized in the family activity pack could also serve as a basis for brainstorming additional investigations that can then be designed together and investigated.

Educating Parents. The design of the family activity packs can provide parents with open/inferential questions to use during the activity and information about the importance of wait-time. Parents need to be provided with suggested questions that are better highlighted within the family pack and with an explanation of the importance of wait-time. By making these changes, parents may be more confident in the implementation of the activity and the likelihood of the child's responses to the questions becoming longer and more complex may be increased.

Family Pack Components. The family science activity packs should be created to provide multiple

family members with the opportunity to participate together in the activity. Inexpensive materials need to be considered in order to further highlight that science activities are easily done at home with little monetary investment. It is also important to include additional information on where parents can find further science activities to do at home.

Family Science Activity Pack Implementation. Throughout this research study several suggestions for implementation of the family science activity packs became apparent. 1. Provide students with several days to complete the science activity at home with their families. As we know, family life can be extremely busy so providing families with some time to complete the activity can be beneficial. 2. To increase the likelihood that they are completed and returned to school, explain the components and expectations for the family science activity packs to parents at the beginning of the year (such as during an open house or conferences) and to students before they take them home. 3. Expect to lose materials. It is inevitable that some materials will be lost along the way, but if inexpensive materials are chosen, then this can mitigate the impact this loss will have on the overall implementation of the family science activity packs.

Other articles that may be helpful to read on this topic include two articles from the publication *Science & Children*, published by the National Science Teacher Association (NSTA).

Czerniak, C. M. (1994, September). Backpack science. *Science and Children*, 46-47, 79.

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