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Linking Home and School Through Children's Questions That Followed Family Science Workshops

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This research brief describes some preliminary findings from the CREDE research project, "At-Risk Preschoolers' Questions and Explanations: Science in Action at Home and in the Classroom," conducted in collaboration with the Family Science project of Life Lab Science at the University of California, Santa Cruz. Life Lab Science also collaborates with another CREDE project called LASERS (Language Acquisition through Science Education for Rural Schools). Together, these three projects conducted a set of Family Science workshops that comprise the focus of this research brief.

Background

Children's questions reveal a great deal about their understanding or misunderstanding of complex topics (Callanan & Oakes, 1992; Callanan, Perez-Granados, Barajas, & Goldberg, in preparation). In several studies we have asked parents to keep track of their children's "why" questions. These diary reports indicate that young children from different backgrounds ask sophisticated questions about scientific topics, such as the movement of the stars and planets, and the workings of the brain. Their questions often reveal issues that puzzle children, or they show how children understand the world differently than adults typically do. For example, one child in our study asked, "¿Cómo es que los pescados andan en el agua y no se ahogan?" ("How come fish are in the water and they don't drown?") This intriguing question illustrates a contradiction between one belief the child has about living creatures breathing air and another belief about fish being living creatures that are under water. By asking such questions, children create contexts in which adults may engage with them in explanatory conversations that may advance the children's understanding of a complex scientific topic.

Parent-child conversations about scientific topics may be an important setting where children learn about their world. Not only might children learn new information through these conversations, but perhaps more importantly, they also will learn whether their parents value these topics and how to go about finding answers to questions. Teachers' connections with parents can enrich teachers' understanding of their students and help them create rich and supportive learning environments. The Family Science project builds on the "funds of knowledge" approach and focuses on helping teachers understand how parents can contribute to classroom learning in ways that will make teachers more effective. As Moll

and Gonzalez (1994) have pointed out, parents possess funds of knowledge that can be utilized to great benefit in the classroom. Contextualizing classroom instruction by making connections to children's community and cultural experiences is an essential way to make curriculum meaningful for children (Tharp, 1997). Another way for teachers to contextualize instruction is to communicate with parents regarding children's interests and ideas. Finding out about conversations at home may inform teachers about how particular children understand the topics they are studying at school.

The goal of this research project was to begin assessing the usefulness of children's questions for teachers as they design a curriculum to fit the needs of the particular children with whom they work. If teachers know about the questions that children are asking at home, we reasoned, they will be better able to tailor classroom activities to children's understanding and interest. In collaboration with Life Lab Science, we conducted a study with four components: (1) we observed parents, children, and teachers engaging in Family Science workshops focused on garden-based activities; (2) we conducted telephone conversations with parents, asking them to report to us any questions, comments, or activities that their children had initiated at home after the workshops; (3) we held "brainstorming" sessions with the teachers, reporting to them about the children's questions and discussing ways that the children's ideas could be incorporated into the next workshop; and (4) we observed the activities of the children, teachers, and parents in the teachers' second workshops.

We worked with schools that served a large, low income, Spanish-speaking population. Teachers from these schools participated in training and then arranged to conduct two Family Science workshops, on two of four possible topics (bugs, seeds, soil, or plants). Each teacher advertised the workshops, inviting students from their own classes, along with other family members. Some teachers included students from other classes. Children's ages ranged from 1 to 12 years old (including siblings), but most of the children were between 5 and 7 years old. Some families attended both workshops, while others attended just one. Researchers were present and participated in the workshops, and both sets of workshops were videotaped.

In general, this pilot project revealed the potential usefulness of linking home and school with regard to children's questions. In the remainder of this brief, we

summarize the preliminary findings on (1) children's questions and ideas that were generated from the workshops, (2) teachers' ideas about how to link children's questions to curriculum development, and (3) parents' evaluations of the Family Science workshops.

Children's Questions

As in our previous work, we found that children's spontaneous questions and comments reveal their curiosity and skill in figuring things out. Parent reports in our phone interviews confirmed this finding and included many examples of questions and ideas that children expressed in home conversations. Children asked parents questions about many of the workshop topics and extended what they learned to new situations. For example, one child who participated in a workshop on soil asked his mother, "¿Cómo pueden vivir las lombrices abajo del suelo si nosotros caminamos encima? ¿Por qué no se mueren?" ("How can a worm live underground if we walk on the ground? Why don't worms get killed?") It is clear from this question that the child continued to think about the things he learned in the workshop and to make inferences about how things fit together. Another child made predictions about plants at home, such as which ones would grow taller. Parent reports thus demonstrated that parents know a great deal about how their children process the things they are learning in school.

Linking Children's Ideas to Curriculum

In our brainstorming sessions, teachers generated very interesting ideas about how to build on children's questions. One child seemed to think that because water is good for plants, it would be a good idea to water a plant as much as possible. When told about this, the teacher decided to try and demonstrate for children what happens to plants that have been watered too much as well as to those that have been watered too little. In this and other examples, teachers thought that one child's misconception might be shared by other children. Teachers most often chose responses to children's questions that would communicate ideas to the whole class. We observed the ways that teachers actually carried out these new ideas in subsequent workshops. We are in the process of examining the videotapes to determine how the children and parents responded to these activities.

Parents' Evaluation of the Workshops

The phone interviews with parents provided a way for parents to give direct feedback on the workshops and their effectiveness. Parents were overwhelmingly positive about the workshops. They commented favorably on the content, the approach, and other aspects of the workshops. Parents talked about many things their children learned in the workshops, including how plants grow, what habitat insects need to live, and how compost helps in producing food and soil. Some of the parents also reported learning information themselves from the workshops. One mother reported that she learned that worms

produce soil. Others talked about tips they learned for planting seeds effectively. Parents often mentioned that children had a new awareness for plants or insects after participating in the workshops.

Parents also saw the instructional approach as an important aspect of the workshops. Many parents mentioned that they liked the "hands-on" nature of the activities and the clear way that ideas were explained by the teachers. They reported that the children found the activities to be engaging and fun, and that they believed this aspect made children learn more about the topic.

Perhaps the most powerful statements parents made were their reflections about these workshops as an important experience for them to share with their children. One mother commented that she liked the workshops because they made her realize that while children can learn by themselves, they learn more when their parents are around. Another mother described how the activities made her feel comfortable because they supported her Mexican culture. One other parent said that she liked the workshops because they encouraged children to think of parents and teachers as working together.

Summary

Overall, although our analysis of the results of this study are still in progress, these preliminary findings are informative in several ways. First, they provide further evidence of children's spontaneous questions as a source of information about how children develop scientific concepts. Second, they suggest that helping to make links between home conversations and classroom practices could be very beneficial to children. Third, the findings demonstrate that home-school activities such as Family Science workshops can be extremely positive experiences for parents, teachers, and children alike.

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For additional details on using home-school links to encourage children's curiosity about science and the supporting research, contact Maureen Callanan, Psychology Department, University of California Santa Cruz, 1156 High Street, Social Sciences II, #277, Santa Cruz, CA 95064, (831) 459-3147, callanan@cats.ucsc.edu. For more information and other documents on this CREDE project and for further CREDE research on science and diversity, visit www.crede.ucsc.edu.