



COURTESY SCIENCE CENTER, MONTGOMERY COUNTY, MD.

## Science Centers

*for children in the elementary school*

EVENTS in today's world in which our younger citizens—children—are living should cause us to reflect and to plan more wisely the kind of educational program we need. Reflection on trends in today's world and the behavior of children in their life space gives us some directions. But what kind of world do we really want? What kind of behavior do we want? What attitudes and values do we wish for children? What kinds of experiences are desirable? Do we want children to grow in resourcefulness? Do we want children to grow in responsibility? Do we want them to grow in their power to interpret physical phenomena around them? Do we want them to grow in their power to think, to turn their guesses and hunches into working hypotheses?

The directions we choose for the development of science experiences in the education of children must be for all children. Two hypotheses may give us clues as to directions.

1. *If our directions are in keeping with the goals of our American democracy,*

*then there must be respect for each child as a person and his potentialities for becoming.*

This means that children must have ample opportunities to plan their own science experiences and to make choices and decisions in keeping with their own maturity levels. This must begin when children are very young if they are to become intelligent and creative citizens, capable of making choices and decisions affecting their own lives as well as others, because:

Power should be in the hands of all the people. There is power in the knowledge of science. People living in a democracy should realize this and keep the control of that power in their own hands. This means that science is fundamental in the education of boys and girls, for they must become intelligent citizens in order to make decisions necessary to manage a democracy that uses science as one of its tools.<sup>1</sup>

<sup>1</sup>Gerald S. Craig. *Science for Elementary School Teachers*. New York: Ginn and Company, 1958. p. 39.



COURTESY SCIENCE CENTER, MONTGOMERY COUNTY, MD.

***Science Center provides material for experimentation.***

*2. If we believe in the principles of individualization in learning, then we must provide opportunities for all children to interpret physical phenomena around them.*

It is only natural that interests of children as well as their ability to interpret physical phenomena will vary. There will be great variation, too, in depth of understanding. Nevertheless, we are beginning to sense that young children are quite capable of dealing with more scientific phenomena than we have believed.

There are many ways to assist children in their quest for finding out about their physical environment. They are by no means limited to classroom experiences. The immediate out-of-doors becomes a laboratory with almost unlimited opportunities. Another way we may help children to make discoveries is through "science centers," in which a wide variety of materials and equipment can be made easily accessible.

If we believe that children's science experiences need not be limited to their own classroom, then some space may be provided that will afford more oppor-

tunities to develop resourcefulness and a sense of responsibility. Some science centers now being developed give hope of enhancing the science experiences in the school program for children.<sup>2</sup>

From a child's point of view, some of the possibilities of a science center for children are these:

Opportunities for self-discovery through observation and experimentation

Use of materials needed in experimentation or observation not easily available to children in the home or immediate community

Acquaintance with some materials not usually found in a classroom

Acceptance of individual responsibility by practicing wise use and care of materials and equipment, including safety precautions

Gaining more independence while pursuing an individual, a small group, or a whole class interest or project originating in the classroom

Learning procedures for checking needed materials in and out similar to those used in the school library.

### Science Centers for Children

*A science center is a place that helps children understand science.* Even in a walk around the room they respond to situations by touching and feeling, listening and hearing, looking and seeing, smelling or tasting. Frequently a child responds with ideas, hunches or guesses, questions or problems. He sees that experiments are set up in which someone is trying to solve a problem or to discover something. The scene changes frequently because the science experiences of children are in a constant state of change.

<sup>2</sup> One science center is located in the Somerset Elementary School, Montgomery County, Maryland. Mrs. Kathryn Bricker is the principal of this school.

**Etheleen Daniel is Supervisor, Elementary Schools, Montgomery County, Maryland.**

Children see that the science center is a place where things live and grow and change. For example, at one time they may observe habitats of fresh water life, woodland life, desert life, a bog, subtropical life, or a thriving beehive. Concurrently another small group may be experimenting with conditions for seed germination involving two dozen kinds of seeds.

In the science center, children can see experimentation in a true sense being carried out, because here the facilities and materials encourage attention to more variable factors and controls. Occasionally children see plant propagation or photosynthesis being studied with light as the controlling factor. Children see that a nearby storage space is clearly labeled for "Living Things." Here they will find many raw materials related to this area of science.

In another space in the room, the focus is on the force of magnetism. Here children discover the meaning of *polarity* and *field*. They use magnets of different shapes and sizes, such as the cylindrical, bar, horseshoe, breaking bar, circular or floating magnets. Older children know the storage space labeled "Magnetism" has many raw materials. They see that the science center makes many such materials easily accessible. As children come and go to the science center they see new areas of interest come into being. Presently a weather station is in process of being developed. Here children see and use a variety of indoor-outdoor thermometers, rain and wind gauges, barometers, an anemometer and weather maps.

In the science center, children see a greater variety of globes than they have in their own classroom. Some newer globes even help them more easily track

satellites and missiles or find out about the magnetic poles of Earth. Here they see planetariums and other models helpful in finding solutions to questions about space beyond Earth.

A large workbench is available, as well as tools, dowel sticks, scrap lumber, or wire screen. These materials make it easier to construct cages, stands or frames to suit the design of an experiment. Therefore, children do not need ring stands, a kind of equipment commonly found in laboratories.

In another space, children can see a large blueprint cabinet, with each drawer clearly labeled as to content. One drawer holds large reading glasses and various kinds of lenses. Another holds smaller tools and materials, such as glass cutters, spatulas and spoons. Other sections of this cabinet help keep a variety of materials organized and easily accessible to children. Sometimes children make original uses of objects to suit their own purposes. For example, stools come in handy for globes or for holding machines for individual viewing of filmstrips or 2 x 2 color slides for science data. The center is equipped for viewing films or listening to or making tape recordings.

***Young children are introduced to the forces of magnetism.***

COURTESY SCIENCE CENTER, MONTGOMERY COUNTY, MD



In this science center children see and use current science books. Many of these books are not yet available in the school library. Here children have an additional resource in pursuing an interpretation of scientific phenomena. They are helped to use these books critically. Books for all reading levels cover astronomy and space; machines and tools; sound; living things; plant and animal communities; soils, rocks and minerals, conservation; power and energy; atoms and molecules; anthropology and archaeology; magnetism and current and static electricity; chemical change and action; the metric system and other topics.

Open shelves above the sink hold many common, everyday materials. This space may remind younger children of mother's kitchen at home. Here they see pyrex dishes of many sizes and shapes, alumi-

num pans and teakettles, strainers, several hot plates, plastic and tinfoil containers, and discarded cafeteria trays. Flasks and beakers are not missed nor are they needed in this science center. However, children do need many containers, both large and small. Pupils should never be robbed of an opportunity to contribute from their own resources from the home or community. Neither should science experiences be delayed or missed entirely because of lack of materials. The center has materials and equipment not easily available to children from some homes in the community.

*The science center is a place for self-discovery.* Children should have considerable freedom to come and go between their classroom, the school grounds, and the science center. Usually children

***The center has materials and equipment not easily available elsewhere.***

COURTESY SCIENCE CENTER, MONTGOMERY COUNTY, MD.





COURTESY SCIENCE CENTER, MONTGOMERY COUNTY, MD.

*New objectives may be developed as teacher and children think and plan together.*

working in the center come with a definite purpose in mind. Such an objective may be developed through guidance and time to think, to plan together, to make choices and decisions, and to test the consequences of one's behavior.

Self-discovery comes if children are free and have encouragement to respond to science experiences involving:

roughness, smoothness, sharpness, friction

lightness, heaviness, thickness, density  
shininess, dullness, brightness, darkness

transparency, opaqueness, translucency, light

hardness, softness, brittleness  
lifting, pushing, pulling, rolling, work, energy

floating and sinking  
heat and cold, melting and freezing

solids, liquids and gases  
high and low, soft and loud, vibrations  
forces of gravity and magnetism  
speed, acceleration, inertia, momentum, motion.

Self-discovery comes when children approach science experiences with imagination, novelty and originality. Thus, in being alive to many experiences, they develop a growing confidence and an inner openness to experiences. This quality of openness, awareness and responsiveness to results of science experiences is an important condition of creativity.

Therefore, as children grow in their power to think and to use elements of many scientific procedures, they will learn how to change hunches and guesses into working hypotheses. Frequently they come to the science center with a brief statement as to: "what I want to

*find out,* "materials I need," "what I did," "what I observed," "what I found out." Some 10- and 11-year-olds, working on a problem, come to the science center with a plan which includes hypotheses and design of experiments. Frequently these are recorded on charts in the classroom or in the science center.

Teachers need to have an openness to and awareness of science experiences for children. When this is true, they will seek varied opportunities to become more adequate in helping children to interpret physical phenomena.

Most teachers want and seek ways to become adequate in their science work with children. There are many ways of doing this. We have observed that teachers gain considerable skill and adequacy as the supervisory staff helps them to help themselves in the same science center used by the children.

Teachers are free to make their own choices and decisions to participate in workshops. Sometimes these workshops are held for two or four weeks in our summer programs for teachers. They are often held in afternoons after school. Occasionally small group workshops or conferences are held during the school day. Purposes of workshops are determined by the group. Materials and equipment, however, are available in variety and quantity to work in the areas of living things; habitats and communities of living things; rocks, minerals and soils; air, atmosphere, weather and climates; magnetism and static and current electricity; heat, light and energy; Earth and space beyond Earth; chemical change and action; machines, work and energy; sound and motion; and other physical phenomena. Teachers sense that the focus, as it is with children, is on self-discovery. They know that neither children nor they make discoveries for man-

kind; yet they also know that discovery is the essence of learning.

Teachers come to feel that they need not be specialists in the many fields of science. Rather they are specialists in how children grow and learn in interpreting their physical environment and they are continuously enlarging their own backgrounds and understanding along many lines. Thus teachers come to place high value on working with certain scientists in specific areas or with other people who have specialized knowledge and know-how.<sup>3</sup> On the other hand some teachers are sought as resource persons.

The science center has become a resource to many principals, teachers, supervisors and total faculty groups. Here they can examine and critically review materials, equipment and books for children as they seek ideas to enhance their own science work in the classrooms. In our county, during the past two years, the first science center seems already to have become one of many ways for developing meaningful science experiences for and with children and teachers. As a result of this we are presently engaged in organizing six more science centers throughout the county. Our first purpose is to increase the quality and to afford more opportunities for science experiences for children. Second, each of these centers will become a place which will serve a number of teachers in nearby schools. These centers will help create myriad opportunities for teachers to become ever more adequate in their work with children.

<sup>3</sup> Among special consultants in our science work in the centers or in curriculum work are Lewin Wh'at, State Department of Education, Baltimore, Maryland; Gerald S. Craig, Teachers College, Columbia University, New York City; Glenn Blough, University of Maryland, College Park, Maryland; Mack Perry, Brooklyn College, Long Island, New York.

Copyright © 1962 by the Association for Supervision and Curriculum Development. All rights reserved.