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Where Do Bears Sleep? is a science book written especially for early years students, who are often described as wild and wonderful. They are cheerful, enthusiastic, energetic – ready to try anything! Because of their rapid development, they are sometimes boastful and bossy – excited and ready to celebrate their new fine- and gross-motor skills. Typically, these students love adventure, excursions, and discovering how things work. At this stage of development the world is their laboratory. As you work through the activities in this book, you will discover that no matter what scientific experiment you present, your young learners will reward you with their wholehearted appreciation for each experience. Their delightfully uncritical enthusiasm for learning will make teaching them a true pleasure.

Instead of calling the activities in this book experiments, I have chosen to use the term *experiences*. Each scientific experience is a developmentally appropriate approach to guide youngsters to an understanding of basic science concepts, and to teach them how to hypothesise through open discussions and learn through self-discovery. The activities are called *experiences* instead of experiments, because an experiment is something done quickly and soon forgotten. Experiences, on the other hand, are accomplished with all five senses. Experiences are the extraordinary events we treasure for a lifetime – lessons etched in our minds forever. There is a Chinese proverb that goes something like this:

*I **hear** and I forget,*

*I **see** and I remember,*

*I **do** and I understand.*

So in the spirit of true learning, each scientific experience in this book is divided into three categories:

- **Hear** – introduce concept by asking a question and having an open-ended discussion.
- **See** – teach concept by explaining facts and demonstrating a scientific experiment.
- **Do** – reinforce concept by providing an opportunity for children to learn through self-discovery.

Hear

The **Hear** section of each lesson launches the science experience by asking a question. These riddle-type questions are a way of opening discussion and motivating children to think about and share ideas. Ask the question of the lesson and allow plenty of time for the children to share possible answers. This part of each lesson gives the children a chance to use their imaginations and explore a wide range of possibilities. Remember, when we listen to a person it sends a clear message about our interest and validates the speaker's worth. No matter what answers are given – no matter how far-fetched – record each one on the blackboard and praise the children for creative thinking. Celebrate and encourage their wonder! Do not say that one answer is correct while others are wrong. Instead, just as scientists hypothesise, explore all the possibilities. Learning the process of determining a wide variety of possibilities is as important as actually grasping the scientific fact. In the second and third parts of each lesson (*See* and *Do*), youngsters will be introduced to specific scientific principles and perhaps through their play they will learn the answer to the initial questions. But whether they understand and can verbalise the answers is not important. The question and discussion stage of each lesson is simply a time to board a spaceship to begin a great scientific journey.

See

See activities will give you, the teacher, an opportunity to present basic scientific facts and demonstrate scientific principles. Scientific facts are brief and simple. Scientific terminology, such as vertebrates, amphibians, metamorphosis, crustaceans, and savannas, are placed in parenthesis. This will give you the opportunity to use the terms or leave them out of the lesson, depending on the group of children you are teaching. The science demonstrations are fun and only require easy-to-obtain materials. Since most young students possess a natural curiosity, they enjoy watching scientific demonstrations. Their optimism and acceptance of the world makes everything they see enchanting. Take your time and allow questions and discussion before, during, and after each demonstration. Record any questions that the experiment triggers for your children. Encourage everyone to ask questions. Wonder is contagious. Through your own curiosity and engagement, children will model the awesomeness of it all. Do not forget, you are the captain of each scientific starship adventure.

Do

Because most early years students are social, cooperative and inquisitive, the final step of each scientific experience (**Do** activities) may well be the most popular with your group. The activities offer hands-on experiences, open-ended adventures, and playful investigations. Keep in mind, children this age still may have varying grasping abilities; hands may function slowly and they may demonstrate a certain insecurity. Disequilibrium may make some experimentation difficult. Young students are easily stifled by adult agendas. Go slowly. Be flexible. Allow plenty of time for children to become immersed in investigations. Do not interrupt them or get in the way of their learning. You may even be pleasantly surprised to learn that children's enthusiasm will lead them into deeper and more complex concepts than you ever set out to teach.

Young students are typically speedy. Everything they do must be done quickly, and they are also quick as they jump from one interest to the next. If you see that you are losing the interest of the children because a discussion or experience is taking a long time, present small bits of information on separate occasions. Bite-sized pieces may make the learning more enjoyable. Remember, children this age need and respect boundaries and limits, which they cannot set for themselves. When leaving children to work on their own in small groups, make sure they know all the safety rules. Encourage free play with the scientific equipment; it will lead the children to discover many principles that have not been presented in a formal way in this book.

After the children have had plenty of time to complete the activity, allow time for groups or pairs to demonstrate, talk about and share what they did or learned. Special enrichment activities: 'A Closer Look' (videos to view), 'Share a Story,' 'Take It Home' (riddles to share with family members), 'Further Exploration' (special enrichment ideas) and useful web sites are also included where applicable.

While using this book, remember, there is no need to arrive at scientific conclusions. The exploration journey and discoveries along the way are far more important than reaching a final destination. If the children are interested, be sure to encourage them to take their experiences one step further. See the next page for tips on developing science process skills.

Take It One Step Further

When I was a first-year teacher, I met a wise, old man who told me, 'All children will learn, if the grown-ups will just get out of their way'. That ruffled my feathers – being a brand-new teacher, I was ready to test my wings. I just knew that it was my job to teach the fledglings to fly, lead the flock, show them how to soar. But over the years in my work as a parent, teacher, and writer of educational materials, I have learned to honour those wise words: 'get out of their way'. Self-discovery leads the way to all meaningful knowledge. After using each science experience in this book (asking the question, introducing the hypothesis, demonstrating the principle, and providing a follow-up experience) I urge you to allow children time to talk about what they have learned, to ask new questions, and to explore other scientific principles that evolve during the lesson. A good way to provide further exploration is with Science Centres where your children can develop their science process skills.

Observation Centre

To motivate closer **observation**, set up an area where the children can get up-close experiences. The Observation Centre should offer magnifying glasses, plastic mirrors, magnifying stools, insect magnifying boxes for the children to use. For example: after finishing page 19, 'How Do Crickets Make Music?' make some cricket cages (instructions included) and gather a few crickets. Give the children plenty of opportunity to observe the animals, their body parts, how they move, and how they detect food.

Comparison Centre

To encourage **comparing**, set up a Comparison Centre. Include a balance scale and objects to compare weights: fruits and vegetables, various kinds of seeds, pebbles, seashells, gem stones and rocks, leaves, pinecones, nails, cotton balls, feathers, etc. If interested, the children also may bring objects from home for the Comparison Centre. Have the children use the balance scales to see which objects have more mass, which are equal, and which have less. Include paper and crayons for recording their discoveries.

Classifying Centre

To help children learn how to **classify** information, introduce vocabulary for attributes: colour, size, texture, shape, kind of material, shiny or dull. For example, after completing 'Why Do Leaves Change Colours?' on page 31, gather a number of leaves in different colours, sizes, textures and shapes, plus baskets for sorting the leaves. After a child sorts the leaves, ask him or her to explain the attribute used for sorting.

Measuring Centre

To encourage children to **measure**, provide counters, rulers, measuring cups and spoons, bathroom scales, strings of different lengths, thermometers, an egg timer, tubs of water and a sand table. A permanent sandbox or sand table offers the children informal play experiences based on measuring volume of various containers. Tubs of water provide opportunities to test the buoyancy of all kinds of objects.

Communication Centre

To encourage children to **communicate** what they have learned, have a special place to come together to reflect on what has been discovered and processed. Reviewing, discussing, and concluding will increase the vocabulary they need to process information. A Communication Centre should include: paper and crayons for drawing pictures after each experience, tape recorder for recording data, notepads for tally marks, and other materials for displaying the results.

In closing, I just want to remind you of some words of wisdom: *All children will learn, if the grown-ups will just get out of their way.*

Why Does Popcorn Pop?

Hear

Ask: Why does popcorn pop?

Share: Discuss the possibilities. Do not indicate a correct or incorrect hypothesis. Accept every idea shared.

See

Materials: Popcorn, air popper, paper cups

Explain: Why does popcorn pop? Every kernel of popcorn is like a little steam engine. It has a certain amount of moisture inside. The outside of each kernel is a thin, hard covering (enamel). This hard covering holds the moisture within the kernel. When heated, the moisture inside the kernel turns into steam. As the steam pressure builds it has no place to go, so an explosion occurs. Wow! Then you have popped corn!

Experience: As you pop the corn, sit quietly and listen for the sound of the first kernel exploding. Note how the popcorn pops slowly at first, then gets so fast everything seems to be popping at once. Pass out the popcorn in paper cups and enjoy.

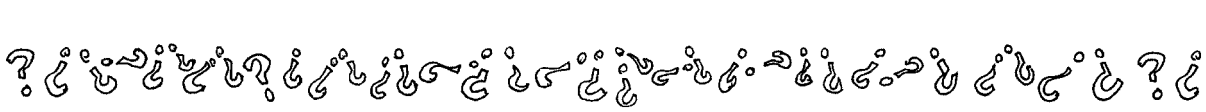
Do

Get Ready: For this experience you need to collect popcorn cartons from a cinema. You can ask them to donate some empty ones. You will also need potting mix, popcorn seeds (not just popcorn – it may have been treated and will not grow), and water.

Get Set: Popcorn is a seed. When you pop popcorn, did you know you were popping seeds? We eat lots of seeds. Peanuts are seeds. Sunflower seeds are, of course, seeds. (Explain to the children that they should only eat sunflower seeds and other seeds given to them by their parents. Wild sunflower seeds that are grown to feed birds should not be eaten.) Rice is a seed. What other kinds of seeds do we eat?

Go: Plant popcorn gardens in popcorn cartons. Fill the cartons half full with potting mix. Scatter popcorn on the surface of the soil, then gently rake the seeds into the soil with your fingertips. Soak and place the cartons in a sunny window. Be sure to put each carton on a saucer. When the popcorn plants sprout, the planters will make interesting conversation pieces or great gifts for TV or movie buffs.

Take It Home: Encourage the children to share with family and friends the facts they are learning about plants by teaching them this riddle: 'What seed has to explode before you can eat it?' (popcorn)



Why Does Your Heart Beat?

Hear

Ask: Why does your heart beat?

Share: Discuss the possibilities. Do not indicate a correct or incorrect hypothesis. Accept every idea shared.

See

Materials: Stethoscope

Explain: Why does your heart beat? Your heart is a pump that keeps your blood moving through the blood vessels. If your heart stopped beating, you would die. Why? Blood has to keep moving through your body to carry air (oxygen) and food (nutrients) to your brain and all the other parts of your body. The beat you hear when you listen to your heart with a stethoscope is the pumping action of your heart. Do you know these facts about the heart?

1. Your heart is a hollow muscle.
2. Your heart is about the size of your fist.
3. Your heart never stops beating.

Experience: Pair the children. Have each child take a turn placing his or her head on the chest of his or her partner, or use a stethoscope to listen for a heartbeat. Have the children use their voices to note the beat. *Example:* Thump, thump. (pause) Thump, thump. Look at the size of a fist. Can the children feel their chests for their own heartbeats? Try running and then checking heartbeats again. Does the heart speed up or slow down after exercise?

Do

Get Ready: Small adhesive bandage

Get Set: Can you remember a time when you cut yourself and blood came out of the cut? Why do you think you bleed when you cut yourself? Your heart is always pumping blood through your veins. When you cut yourself, the blood is still being pumped so blood may leak or squirt out of your body. The best thing to do is put pressure on the wound to stop the bleeding. When your mum or dad puts a small bandage on a cut, it sometimes helps to stop the bleeding because it covers the opening in the skin.

Go: Discuss what to do if a child is bleeding. Remind the children to tell an adult. If there is not an adult nearby and you have to care for yourself or another person, follow these steps: Wash the cut and place a bandage over the wound. Firmly press down and do not take your hand away until you are sure the bleeding has stopped. Get help. Have an adult check the wound.

Further Exploration: During the day, ask the children to listen for each other's heartbeats. First thing in the morning, ask, 'Is it beating now?' Before lunch, ask 'Is it still beating?' Before the children go home, ask 'Is your heart still beating?' Have them check for their own heartbeats just before they fall asleep and the first thing in the morning.