



EXPLORING THE SCIENCE OF SOUNDS

100 Musical Activities For Young Children

Abigail Flesch Connors



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DEDICATION

To Shannon, with love and gratitude

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INTRODUCTION

Music is a magical thing. It helps us celebrate our joys and ease our sorrows. It excites us, calms us, and enchants us with its mysterious power.

Music is also science.

I first learned this from my wisest teachers—the young children in my music-enrichment classes.

For instance, in one recent class, I was teaching a group of four-year-olds how to tap and scrape rhythm sticks as a recording of instrumental music played in the background. The children happily tapped and scraped to the beat of the music, but they also asked:

"Why do some of the sticks have bumps and some don't?"

"Why are some sticks red and some sticks blue?"

"Why is it louder when I play like this"—holding the sticks flat on the floor—"instead of like this?" (holding them in the air).

"What would happen if I hit the sticks on the floor as hard as I can? Would they break?" This particular question wasn't asked aloud. The child performed this experiment on her own. Fortunately, rhythm sticks are quite sturdy!

So, why were the children asking all these seemingly irrelevant questions? When I was younger, I assumed it was because young children had short attention spans. Years of experience and of exploring what scientists know about how young children learn have changed my opinion. Questions like these aren't irrelevant—they're scientific!

Spoiler alert!

Music activities almost always bring out children's scientific curiosity. Unfortunately, we rarely take advantage of this opportunity to help them develop scientific thinking. Let's go back to one of these questions. A child asked, "Why do some of the sticks have bumps and some don't?"

What if I simply told her, "We need the bumpy sticks to make the scraping sound. If we had only smooth sticks, we couldn't make that sound." Okay. That's a true and fairly age-appropriate response. But what just happened?

1. I "taught" the child a "fact" (that she'll probably forget by tomorrow, anyway).
2. I encouraged her (and the rest of the class) in the common belief among young children that grown-ups know everything.
3. Most troubling, this girl was exhibiting scientific curiosity and I shut it down. Just stopped it in its tracks.

Why bother thinking, observing, listening, and experimenting, if a quick and easy answer is as close as the nearest adult? Giving a child the answer to a question of that nature is like giving away the ending to a book before someone's finished reading it. Have you ever had someone spoil the ending of a book or movie for you? Frustrating, isn't it? It diminishes the exciting experience of wondering what will happen. When we tell children the answer, we're spoiling the ending of the scientific story.

We're keeping them from making their own discoveries, which is an innately satisfying and rewarding experience. We're depriving them of what the physicist Richard Feynman called "the pleasure of finding things out." And it's that pleasure, that excitement, that reinforces children's scientific curiosity.

Young children don't really have short attention spans. They're constantly paying attention to everything in their environment. Their brains are processing vast amounts of information, driven by an urgent need to make meaningful connections, to make sense of their environment—of objects, people, sights and sounds, and of their own bodies and identities. What's more, as Alison Gopnik, Andrew N. Meltzoff, and Patricia K. Kuhl describe in their book *The Scientist in the Crib*, children are constantly revising their theories of how things work as they perceive new information. As a matter of fact, young children do think a lot like scientists, and meaningful science activities in early childhood build the foundation for future science learning.

My students' curious questions were examples of valid and very pertinent scientific inquiry. But I didn't realize that when I was starting out as a music teacher. Back then, not out of an intention to "teach science" but just to be a responsive teacher, I began to follow up on the children's not-on-the-lesson-plan questions. For example, if a child asked what was inside the shakers we were playing, I'd ask the class what they thought was inside. Some would say, "rocks," or "little balls," or something similar. If someone suggested an answer that didn't seem to make sense, such as "an animal," I'd gently challenge their thinking. "Hmm. I'm wondering if an animal could live inside a shaker." Voices would immediately ring out, "No! Animals need food." "They need air to breathe." Before you knew it, the class would be having a wonderful discussion, sharing thoughts and using what they already knew to evaluate ideas. We would come to a consensus that the shakers most likely contained many small, hard objects. (I've never deliberately broken open a shaker in the name of research. But I often share with children a story about the time a shaker accidentally broke during a music class—countless tiny plastic beads flew everywhere!)

These informal discussions inspired me to create activities, such as "Mystery Music Can," in which children take turns shaking a coffee can and guessing what's inside it. I started to collect all kinds of unusual instruments, as well as nontraditional sound makers, such as foam egg cartons and old baskets, which, when scraped with a stick, sounded like a guiro. We'd improvise with ways to play them, think about and discuss how we could change their sounds, and try different ideas to see if they'd work the way we thought they would. For instance, we found that hitting a little glockenspiel with a plastic dinosaur did not make it louder. (Some children always want to make things louder.) Glockenspiels are often confused with xylophones. Technically, though, the instruments with metal bars are glockenspiels. Xylophones have wooden bars.

After a few years, I put my sound-exploration activities together and wrote articles about them for parents and teachers. At professional-development

conferences, I presented workshops where early childhood teachers could learn and try out these activities. It was lots of fun, but I was surprised one day when a workshop participant referred to my "science activities." What? No, this is music. I'm not a science person. But when I thought about it, in these sound-exploration activities, the children were observing, listening, asking questions, making predictions, testing ideas, and interpreting results. They were thinking like scientists!

With my amazing students, I tried out more activities exploring the science of music. We learned more about the sound quality (timbre) of various instruments and other objects. We also delved into other elements of music, including tempo and pitch. And we went further, trying to find answers to questions, such as "What is music, anyway?" and "Is there any way we could see music?" The children were fascinated by the process, as well as the content, of what we were learning, and they could be counted on to ask questions I'd never even thought of!

Always curious, I read many books and journal articles about early childhood science education. I found studies showing that many teachers of young children didn't provide enough experiences to foster science skills and build conceptual understanding. Yet, preschoolers are ready and eager to explore science. There was clearly a need for more everyday science activities, not just once-in-a-while special projects.

I wrote this book to address the need for not only more science content but also for more scientific thinking in preschool. First, young children need to be actively observing, listening, questioning, predicting, comparing, and contrasting—and talking about all these processes—to develop their reasoning skills and to preserve their natural curiosity.

Second, it is essential for children to be able to place the science content we teach them in a broader conceptual context. For this, I found the idea of crosscutting concepts, described on the website of the National Science Teachers Association (NSTA), very useful. (See http://ngss.nsta.org/CrosscuttingConceptsFull.aspx.) Crosscutting concepts can be thought of as the "big ideas" of science. As the NSTA states, "they have application across all domains of science . . . [and] include patterns; cause and effect; scale, proportion and quantity; systems and system models; energy and matter; structure and function; and stability and change." The NSTA stresses that "these concepts need to be made explicit for students." For example, children may find it interesting that the smaller bars on a glockenspiel make higher sounds than the longer bars. This could be just a "Wow, that's cool!" moment, quickly forgotten. But if we help children understand that the relationship between size and pitch is true for all objects and materials, all the time, everywhere—then those children will be more likely to look for, recognize, and understand other proportional relationships.

Music activities are a natural way to include science education in your curriculum. Young children have already had many positive experiences with music and respond enthusiastically to music activities. And they have abundant curiosity about music and sounds of every kind. They're eager to investigate what music and sound are all about.

How to Use This Book

I have tried to keep the materials needed for these science experiences to a minimum. Most of the activities require very few, and many require none at all. You can find the music suggested in the activities by browsing music-purchasing websites or mobile apps for Apple or Android devices. The emphasis is on helping children to use their own brains and bodies to solve problems, such as "Why did that happen?" and "How could we make this happen?"

I've arranged the activities in *Exploring the Science of Sounds* in learning areas, beginning with an area in which children have a strong knowledge base—the sounds of their own bodies. The next area explores the basics of how sound moves—information students will need to understand the concepts introduced in the following sections. After exploring the sound quality, or timbre, of a variety of objects played in different ways, we move on to the other elements of music. Students further investigate the concepts of time, distance, force, size, and vibration in the sections on loudness, tempo, and pitch. We leave the classroom to explore sounds in the world outside. Finally, children build their own instruments from natural and recycled materials, extending their understanding of the science of sounds and adding their own creativity and individuality.

These areas flow in a meaningful sequence, but you certainly don't need to lead them in order. The activities are a resource for you as you support your students' emerging scientific curiosity. For instance, a child may ask why cymbals are so loud. That's a cue to help the class explore loudness, and you'll want to go to activities in that area to help the class discover for themselves that it isn't the instrument itself that's loud—it depends on how forcefully you play it. (And they'll even discover that

they can make soft sounds with the cymbals, too.) Your students' interests and curiosity should be your guide.

And one more thing—I'll remind you about this throughout the book, because I find I need to keep reminding myself—take your time. If you ask a question about what children observed or heard or what they predict, and you get one or two responses, wait. Then ask, "Does anyone else have any ideas?" Repeat the original question—maybe in a different wording—and wait some more. There will be more responses. Don't be afraid of a little silence. Silence can be the sound of children thinking.

CHAPTER ONE

THE SOUNDS OF OUR BODIES

KEY CONCEPT

Different parts of our bodies make different sounds, and we can make more sounds by moving parts of our bodies in different ways.

Ask the children to think for a minute (without saying anything yet) about sounds they can make with their bodies. After a short time, ask them to raise their hands if they can make a sound with their bodies for the class to hear. Some may clap their hands, stomp their feet, pat their legs, or make other familiar body sounds. Some may make unusual sounds right off the bat. Acknowledge each response with a nod, an *okay* or a *thank you*.

Sometimes young children don't think of talking, singing, or other vocal sounds as body sounds—it's as if these sounds are in a different category for them. If no one mentions vocal sounds, lead them with questions, such as "What's a sound that we make all day long? What sound am I making right now?" They may protest that talking is different from body sounds, and that's a great topic to discuss. How is it different? How is it the same? What about other vocal sounds?

Tell the group that we will be exploring lots of sounds that our bodies can make—and they may discover new sounds they've never thought of before!

LISTENING TO OUR HEARTBEATS

Pa-pum, pa-pum, pa-pum, pa-pum . . . The very first sound we hear, the first thing we're conscious of, is our mother's heartbeat. And as we go through life, the beating of our own hearts is always with us. It's truly the rhythm of life. Since the heartbeat is a major intersection of biology and music, let's begin our exploration here.

What You'll Need

Children's stethoscope

Activity to Try

1. Sing a familiar song, such as "Twinkle, Twinkle, Little Star" with the group. Then sing it again, and have everyone clap to the beat.
2. Tell the children that, just as music has a beat, there's also a beat inside their body that never stops. Do they know what it is? Some will know the answer—our heartbeat. Explain that our hearts pump blood through our bodies to keep us healthy, and the pumping sound has a steady beat. We can feel our heart beating by pressing our right palm over our heart, just slightly left of the center of the chest. (It's even easier to feel it if we place our left hand on top of the right one.) Ask the children to try it, reminding them to be very quiet so everyone can concentrate.
3. Ask what their heartbeats feel like. You might hear responses, such as "It was like a *boom, boom, boom*." "Like a bumping sound." "I couldn't feel anything." All responses are okay.
4. Bring out the stethoscope, and ask the children if they know what it is. They may not know the name, but most will recognize it from doctor visits. Explain that it's a stethoscope, a special device for listening to a heartbeat.
5. Show the child on your right how to listen to your heartbeat with the stethoscope. (I start with my own heartbeat since I know how to find it easily.) Can she hear it? Then help her to listen to her own. Ask her to keep the same beat by patting her chest over her heart when she removes the stethoscope. Have her pass the stethoscope to the child on her right, and continue until all the children in the circle are patting their heartbeats. This activity is very special for young children—I love to see their delighted smiles when they hear their heartbeats!

Questions to Ask

- What did you think your heartbeat would sound like?
- Did your heartbeat sound the way you thought it would? Sometimes each child in the room will want to tell me how their heartbeat sounded. If they want to, I make it a point to listen to every one of them. They're orally representing their observations, and I don't want to brush that off

or seem like I don't have time to listen. Acknowledging their observations is a great way to start off our scientific explorations!

- Did it remind you of any other sound you've heard?
- Did your heartbeat go fast and then slow?
- Did it start and stop, or did it have a steady beat?
- Did you hear a little space between beats, like (demonstrate with hand over heart) *pa-pum* (pause) *pa-pum* (pause) *pa-pum*? When children say they did, tell them that means a beat is a pattern—beat/pause, beat/pause, beat/pause, and so on. Pattern is one of the crosscutting concepts that relate to all domains of science.

TIP

Make the stethoscope available during free-play time. The children can use it (with supervision) to listen to their own and each other's heartbeats.

Discoveries to Make

- Hearts make a sound—the heartbeat.
- Children can feel their heartbeats, and they can hear them by using a stethoscope.
- The heartbeat is a steady, regular beat, and a beat is a kind of pattern.

SOUNDS WE CAN MAKE WITH OUR VOICES

The heartbeat, the most basic sound of the human body, is made by an involuntary movement. When it comes to voluntary sounds, the most common are talking and singing. But these two sounds aren't the whole story. Our voices can make all kinds of sounds, and children love to explore them.

What You'll Need

No materials needed

Activity to Try

1. Tell the class that you'll be exploring all the sounds humans can make with our voices. For instance, right now you're talking—that's a sound you make with your voice. Ask the children if they know other vocal sounds. Some may say singing, but before that, they may think of other sounds, such as humming, growling, sighing, and so on.

2. Go around the circle and have each child make whatever sound they would like to with his voice. Remind them the sounds can be loud or soft, short or long, beautiful or funny—whatever they want. If they copy another child's sound, that's okay. If they make a sound such as clicking their tongue, that isn't, strictly speaking, a vocal sound, but that's okay too. For now, the idea is for children to explore freely and think about the many ways we can use our voices to create sounds.

TIP

Sometimes young children enjoy making sounds, such as squeaks and other extremely high, low, or loud sounds. Let them try these once, but explain that making these sounds too often can make their throats feel sore.

Questions to Ask

- Had you heard all of these sounds before?
- Which ones do you think were the strangest sounds?
- Did anyone think their sound was difficult to make?
- Do you think we can make a lot of sounds with our voices, or only a few sounds? Why do you think so?

Discovery to Make

Children can make many different sounds using their voices.

WAYS WE CAN CLAP OUR HANDS

"If you're happy and you know it . . ." It's no coincidence that one of the most-loved children's songs begins with clapping. Young children love to clap their hands, and it's a natural response to listening to music, especially when there's a strong beat. They also love to invent new ways to clap. I've been teaching for a long time, and my students still find ways to clap their hands that I've never seen before! This activity harnesses that creative energy to study the sounds produced by various styles of clapping.

What You'll Need

A recording of music with a steady beat (See Suggested Recordings of Instrumental Music on page 190.)

Activity to Try

1. Tell the group that this activity is about clapping our hands. You're going to put on some music, and they're going to clap to the beat of the music together.
2. Put on the music, and play it loud enough for children to hear but soft enough that they can hear you speak over it. Begin clapping.
3. After a while, ask the children to copy you as you clap in different ways. Try clapping high above your head, with your arms held straight out in front of you like a seal, and to the left and the right.
4. Pause the music and ask the children to think of new ways to clap their hands. Explain that when you start the music again, if they have an idea, they should raise their hand quietly and wait to be called on.
5. Start the music again, and let the children show you their clapping ideas. Have the whole class try out each idea. They'll usually come up with lots of ideas, but if they get stuck, show them another way to clap to jump-start their imaginations again. You might clap with your hands held horizontally (one on top of another), behind your back, or with your fingers splayed out. Then challenge them to think of some more ways to clap.
6. If the music stops before the ideas stop flowing, play it again from the beginning. Generate as many ways to clap as you can!

Questions to Ask

- I don't think I could ever have thought of all those ideas by myself! Do you think you could have?
- Do you think we could come up with more ways to clap if we did this all day?
- When we clap our hands, do we also move other parts of our bodies, or only our hands?
- (We move our wrists, our arms, our elbows, and our shoulders. If children aren't sure, have them watch you as you clap and observe which parts of your body are moving. Explain that the body works as a system, because the parts of our body are all related and connected.)

TIP

Encourage the children to respect each other's ideas by thanking each child for her contribution. Always emphasize that everyone's ideas are valuable, and we all learn more by sharing our own and listening to others' ideas.

Discoveries to Make

- Children can clap their hands in many different ways.
- Children can think of more ideas as a group than they can individually.
- Hands can move in many ways because they are attached to wrists, elbows, arms, and shoulders, which can all move in various directions.
- The body is a system made up of parts that are connected and related. (Systems and system models are a crosscutting concept that relate to all domains of science.)

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LISTEN TO SCIENCE!

Science, technology, engineering, arts, and math—STEAM—these explorations are crucial for laying a solid foundation for later learning. In this book, discover 100 activities that let children ages 3–6 explore the science of music and sound using materials easy to find for a preschool classroom. Children will use their bodies to create sounds, explore the relationship between size and pitch, investigate how tempo affects the way we listen to sounds, create musical instruments, and much more. From the drops of rainwater to the tinkling of wind chimes, the science of sound is all around.

In *Exploring the Science of Sounds: 100 Musical Activities for Young Children*, you will find playful, hands-on, fun explorations including:

- stirring up some "sound soup";
- pretending to be frogs, crickets, robots — and molecules;
- feeling and seeing the vibrations of sound;
- creating thunderstorms with foil, a windy jungle with newspaper "trees," an orchestra with pinecones and acorns;

and other adventurous investigations!

Along the way, children will develop critical-thinking skills such as predicting outcomes, comparing and contrasting, categorizing, and problem solving.

Activities are aligned with the Next Generation Science Standards (NGSS) and NAEYC Developmentally Appropriate Practice (DAP).

Enjoy exploring new and unique ways to bring STEAM into your classroom!

Abigail Flesch Connors is an early childhood music educator and nationally known presenter. Through her award-winning books, *101 Rhythm Instrument Activities for Young Children* and *Shake, Rattle and Roll: Rhythm Instruments and More for Active Learning*, Abby has shared hundreds of original, classroom-tested, and ridiculously fun activities with early childhood professionals.

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