

Built for Curiosity

The title page appears on screen. Bright, colorful shapes overlap and shift. Upbeat music plays in the background throughout the video.

Text on screen: Ontario Science Centre; An Agency of the Government of Ontario

Animated graphics swipe away the title page and are replaced with small, colourful shapes on a light background. The shapes twist and pulse in place.

Text on screen: Built for Curiosity

Animated graphics sweep away again to reveal Thuc-Nghi. She is standing in a craft room. There is a whiteboard on an easel beside her. On the whiteboard is a drawing of a plant, showing it both above and below ground, with the sun shining in one corner and a bee flying towards the plant. On a table in front of Thuc-Nghi are balls of yarn, craft paper and markers.

Overlaid text on screen: Thuc-Nghi (she/her); Science Educator, Ontario Science Centre.

Thuc-Nghi: Hello, I'm Thuc-Nghi, a Science Educator with the Ontario Science Centre. In previous videos, we've discussed the role of play and inquiry in STEM learning, as well as ways to build the students' scientific and mathematical processes. In this video, we're going to talk about how you can adapt your classroom environment to inspire STEM inquiry.

Children gather in a semi-circle on child-size chairs. An educator squats on the floor in front of them and reads them a book, showing them the illustrations in the book and engaging them in a lesson.

Thuc-Nghi: See these Kindergarteners? They've been reading the Gingerbread Man. And they keep talking about one detail: The fox was *not* a safe way for the Gingerbread Man to cross the river! The teacher, noticing the reaction, asks them a question: What would be a better way for the Gingerbread Man to escape across the river?

The children move down onto the floor and begin "playing out" how to solve the problem.

Thuc-Nghi: Students scatter around the room, discussing how they'd keep the Gingerbread Man safe, dry and uneaten.

Split screen: Thuc-Nghi in the craft room and a series of images: an educator looks on as the children build bridges from brightly coloured connecting blocks; children experiment with objects at a water table; a child draws a plan while another looks on.

Thuc-Nghi: At the Building and Engineering Centre, they build river-spanning bridges. At the Water Table, they test materials to float the Gingerbread Man to safety. At the Storytelling Station, a group is recreating the story using props to change the ending.

Split screen: Thuc-Nghi in the craft room and children work together to build a raft for a Gingerbread Man.

Thuc-Nghi: Although they're all doing it differently, each group is problem-solving a way to save the imperiled cookie.

Thuc-Nghi appears full screen.

Thuc-Nghi: This simple question has a roomful of students collaborating, solving problems,

Overlaid text on screen:

B12.1 state problems and pose questions

B12.3 select materials and tools to carry out investigations and to construct models and structures

B12.5 design, build and test models and structures

Thuc-Nghi: testing ideas and thinking like young engineers. The learning looks different in each space but the thinking is connected—it's an example of how every space in a classroom can be part of STEM learning.

Animated graphics swipe away to reveal a title card with playful geometric shapes.

Text on screen: Materials for Curiosity

Animated graphics swipe away to reveal Thuc-Nghi full screen.

Thuc-Nghi: Activities like this work best when they happen in environments designed to support student curiosity.

Split screen: Thuc-Nghi and text as spoken by Thuc-Nghi.

Thuc-Nghi: The best environments don't say "*Here's what to do,*" they say, "*What could I try?*" As educators, we can create spaces that motivate young learners to explore and problem-solve with minimal adult direction.

A group of children build bridges from wooden blocks and sheets of paper. They test their bridges to see if they support a connecting block. When their bridges fail, they try again by folding the paper in different ways.

Thuc-Nghi: In these spaces, students develop independence and thinking skills by testing ideas in meaningful, achievable challenges. At the same time, they're navigating expectations around creativity, risk-taking and collaboration.

Thuc-Nghi appears full screen.

Thuc-Nghi: It requires thoughtful design to create spaces like these. But thoughtful doesn't mean complicated. Here are some things to consider when designing your own classroom environment.

Animated graphics swipe away to reveal a title card with playful geometric shapes.

Text on screen: Loose Parts and Open-Ended Materials

Animated graphics swipe away to reveal Thuc-Nghi full screen.

Thuc-Nghi: With no predetermined way to play, loose parts and open-ended materials invite students to think and design in flexible and imaginative ways, driven by their own curiosity.

A group of children sit at a play table stocked with cardboard tubes and boxes, tape, scissors, pipe cleaners, and markers. They work with the materials cutting holes, decorating, and taping pieces together.

Thuc-Nghi: The unstructured nature of these materials encourages the learner to combine, move, imagine and transform them. These materials can be almost anything, from household objects to natural materials and more. Your materials will support scientific thinking while your choices can also emphasize concepts and skills like imagination, sustainability, recycling and more.

Split screen: A group of children begin building things from a pile of loose parts on the floor; Text on screen as spoken by Thuc-Nghi.

Thuc-Nghi: Loose parts send a powerful message to students: **You** are the designer. **You** are the decider. **You** can imagine, test and revise your ideas.

Thuc-Nghi appears full screen.

Thuc-Nghi: This shift transforms play from simple activity into purposeful, intentional learning that reinforces creativity and critical thinking. It supports STEM skills like engineering design, spatial reasoning and innovation and it fosters independence and sustained engagement.

Animated graphics swipe away to reveal a title card with playful geometric shapes.

Text on screen: Provocations to Sustain Inquiry

Animated graphics swipe away to reveal Thuc-Nghi full screen.

Thuc-Nghi: Loose parts are vessels for creativity and exploration; a good provocation is what inspires the journey. The best provocations spark curiosity, invite interpretation and have multiple solutions.

The children are on the floor continuing their bridge building. One pair of children has passed the support test by folding multiple sheets of paper in half.

Thuc-Nghi: They're a wholly different experience for students than teacher-led activities that have intended outcomes. This time, the child gets to lead. When designing provocations, you want to create opportunities where your students can plan, test, revise and expand ideas in the context of meaningful problems—like getting the Gingerbread Man across the river.

Another group of children notices the success of folding the paper and try it on their model. They fold theirs in a different way and it passes the support test, as well.

Thuc-Nghi: Because your students are always evolving, the provocations in your classroom environment should be ever-evolving, too.

Thuc-Nghi appears full screen.

Thuc-Nghi: Children master possibilities quickly. Use the same materials for too long and play becomes repetitive and predictable, a sign that thinking has plateaued. By rotating provocations, you keep the environment responsive and intellectually alive.

Text appears full screen as spoken by Thuc-Nghi.

Thuc-Nghi: Here are some provocations and evolutions you can try:

- Building materials (like cardboard, cereal boxes and tape) with photos of bridges, towers, or homes as inspiration in the construction centre—ask students if they can make the tower as tall as they are.
- Magnifying glasses and natural objects for observation and discovery—add in loose parts so students can build their own birds' nests with eggs.
- Fairy tale STEM challenges using loose parts like popsicle sticks, straws, plasticine, and wooden blocks. Build a house for the Three Little Pigs then add in fairy tale characters like the wolf by using a hairdryer to simulate his huff and puff to build on the challenge.

Thuc-Nghi appears full screen.

Thuc-Nghi: Rotation doesn't mean starting from scratch. It can mean adding a new tool, introducing a new question or connecting to new interests. Even tiny changes can encourage deeper thinking.

Children look at photos of city buildings for guidance and inspiration as they build their towers from magnetic tiles.

Thuc-Nghi: Effective rotation follows the lead from students.

We see a castle-shaped model with a drawbridge made from cardboard boxes and tubes.

Thuc-Nghi: If they're building tall towers, you might add balance challenges or new connectors.

A child rolls a wooden toy car up a wooden ramp.

Thuc-Nghi: If they're exploring ramps, you might introduce weights or varied surfaces for testing speed.

We see a group of children build a tower from magnetic tiles of various shapes.

Thuc-Nghi: Your responsive adjustments communicate to students that their ideas are worth extending—and the changes expand their thinking, too.

Animated graphics swipe away to reveal a title card with playful geometric shapes.

Text on screen: Learning Centres as Inquiry Environments

Animated graphics swipe away to reveal Thuc-Nghi full screen.

Thuc-Nghi: Now that we've looked at the importance of loose parts, open-ended materials, and provocations, let's explore some ways that learning centres themselves can be designed. STEM happens naturally in spaces that invite children to investigate, build, test, and problem-solve topics led by their own curiosity.

We see a group of children collaborate on a drawing on a large sheet of white paper, then we see an educator lean in to participate with his students who are sorting brightly coloured foam shapes.

Thuc-Nghi: When educators and environments align, they create spaces where curiosity is inevitable, and experimentation is both safe and expected.

We see children race the sail-powered toy cars they built across the floor by blowing on the sails; then we see an educator encouraging a young student writing on a whiteboard.

Thuc-Nghi: This can happen in any learning environment, whatever the classroom layout, student interests or access to materials—and it can be part of any learning centre, too.

We see a small aquarium that is filled with layers of different colours of soil, then children look into the small aquarium with magnifying glasses

Thuc-Nghi: Take some time to reflect on what play-based learning centres are already in your classroom.

A child is examining an earthworm in the small aquarium with a magnifying glass, then we see children placing vegetable scraps in the soil with their hands.

Thuc-Nghi: Are there centres or resources you could add to deepen your students' engagement?

We see a student with a handful of earthworms, then we see a child examining a bee through a child-size microscope.

Thuc-Nghi: The solutions don't have to be expensive or fancy. Be creative: think simple!

Thuc-Nghi appears full screen.

Thuc-Nghi: Building Zones and Discovery Centres are natural places for STEM ,and you might already have these in your classroom! Here are a few examples of how STEM learning can happen in a variety of centres.

Animated graphics swipe away to reveal a title card with playful geometric shapes.

Text on screen: The Dramatic Play Centre

Animated graphics swipe away to reveal Thuc-Nghi full screen.

Thuc-Nghi: A Dramatic Play Centre is always a big hit in the classroom and is often the favourite space for students who love to engage in role play—it's also a great spot for a STEM twist!

Imagine a vet clinic. There are stuffed animals, scales, X-rays, and measuring tapes. Or maybe it's a space station, filled with maps, switches and buttons. Or how about a bird rehabilitation centre?

We see several autumn-coloured Maple leaves with some glue and a paintbrush, scissors and a marker on a bright blue background.

Overlaid text on screen:

B12.3 select materials and tools to carry out investigations and to construct models and structures

B13.2 sort and classify groups of living and non-living things

Thuc-Nghi: Here, students using loose parts like sticks, leaves and string to design and build safe homes for (imaginary) injured birds.

An educator holds out a bird's nest for children to investigate.

Thuc-Nghi: They're using the items to make nests where their patients can rest and recover.

A child bends twigs into a round nest shape, then we see a nest made of twigs, feathers and fibres.

Thuc-Nghi: As they do this, students are experimenting with natural and manufactured materials, testing ideas and refining designs to create the right habitat.

Thuc-Nghi appears full screen.

Thuc-Nghi: When students are engaged in an imaginative context that connects to real-life situations, they are more likely to sustain complex thinking: Meaningful scenarios keep them engaged in learning.

Animated graphics swipe away to reveal a title card with playful geometric shapes.

Text on screen: The Storytelling Centre

Animated graphics swipe away to reveal Thuc-Nghi full screen.

Thuc-Nghi: Picture a playhouse filled with shelves of loose parts and toy characters just waiting to tell their stories!

A child sets up a miniature table and chairs set with dishes. A small doll with long blonde hair sits at the table. The child holds a toy bear in her other hand.

Thuc-Nghi: The Storytelling Centre is where students step into imagined worlds,

Another child reaches up to build a structure from wooden blocks on top of a shelving unit in front of a “Jack and the Beanstalk” display. Beside her is a “beanstalk” made of green cardboard tubes and craft paper leaves climbing up the side of the shelves.

Thuc-Nghi: retelling tales in their own voices and experimenting with changing the plot.

Another child has built a castle from cardboard tubes and boxes in front of the same display.

Thuc-Nghi: For example, after reading Jack and the Beanstalk, students might be challenged to design and build a way for him to escape the Giant’s sky-high home.

Thuc-Nghi appears full screen.

Overlaid text on screen:

B12.4 draw conclusions and communicate results

D25.3 use problem-solving skills and imagination to create forms of art

Thuc-Nghi: This centre invites students to create scenes, imagine new endings, build props that transform narratives and, of course, to invent their own stories.

Children will want to tell stories in inventive ways, using the loose parts, dramatic play materials and building tools. You can even choose picture books that will spark ideas for design challenge scenarios.

Animated graphics swipe away to reveal a title card with playful geometric shapes.

Text on screen: The Outdoor STEM Lab

Animated graphics swipe away to reveal Thuc-Nghi full screen.

Thuc-Nghi: Don't overlook the great outdoors as a learning centre! Some of the richest scientific and engineering thinking happens in the natural environment. Outside, students encounter variables like wind, water, uneven ground and living things—things that can't be replicated indoors. These ever-changing conditions provoke curiosity and the “ask, test, repeat” process at the heart of STEM learning.

An educator admires small birdhouses his students have made.

Overlaid text on screen:

B13.1 ask questions about and describe some natural occurrences

B13.2 sort and classify groups of living and non-living things

B13.3 compare patterns in natural and built environments

Thuc-Nghi: When we see yards, fields, green spaces and wild areas as labs, logs become balance beams, puddles become an engineering problem and gardens blossom into life science classrooms.

Students on a nature walk examine leaves on a bush with a magnifying glass and take notes.

Thuc-Nghi: Students test gravity on hills, move heavy materials collaboratively and design and build snow structures.

Split screen: Thuc-Nghi and text as spoken by Thuc-Nghi.

Thuc-Nghi: Outside, we hear meaningful questions like “*Why did this fall down?*” and “*What does a worm eat?*” and “*How can we move the water?*” These questions emerge naturally because the environment presents real points of interest ripe with surprising discoveries and problems to solve.

Thuc-Nghi appears full screen.

Thuc-Nghi: As educators, we can intentionally provide materials that further encourage learners to investigate outdoor spaces.

We see a montage of images of children: playing soccer; digging in a pail of soil with toy shovels; examining frost on metal outdoors with a magnifying glass; smiling while holding an earthworm in their hands

Thuc-Nghi: Make tools like ramps, buckets, funnels, collection trays and magnifying glasses accessible to students in every season and your learners will find new uses throughout the year.

We see a montage of images of children: watching how water flows through fallen leaves; rolling a large snowball through the playground; running through a meadow with their educator; holding up magnifying glasses and water-spritz bottles in a forest.

Thuc-Nghi: Outdoor play is more than recess. It's applied physics, engineering, biology and environmental science in action. Authentic learning happens when children are given real materials to explore and that makes the outdoor environment one of the most powerful learning spaces available.

Animated graphics swipe away to reveal a title card with playful geometric shapes.

Text on screen: Conclusion

Animated graphics swipe away to reveal an educator demonstrating a toy air-powered car to her students. She blows up the balloon attached to the car.

Thuc-Nghi: As a teacher, your goal is to create a classroom culture where creativity, thoughtful risk-taking, collaboration and problem solving are encouraged and valued.

We see an educator leaning in to observe his students as they use spoons and funnels to fill clear plastic cups with coloured beads.

Thuc-Nghi: To do this, it helps to be a guide instead of a director. Give your students the time and space to follow their own ideas. Observe. Listen. Encourage. Notice what they're interested in and use those things as a hook for engagement. Capture photos, notes and quotes to document their progress, so you can make their learning visible.

Thuc-Nghi appears full screen.

Thuc-Nghi: Embrace your classroom learning centres, all of them, as places where students can engage in play—whether self-directed, guided or educator-directed—that incorporates countless opportunities for STEM learning and discovery.

When we add materials that are open-ended, provocations to spark curiosity, stations—including outdoor spaces—that are thoughtfully curated, and remember to guide rather than direct, teachers can create an exponential experience. At its best, play becomes the engine, the environment becomes the map, and our students are driven to become innovators.

Animated graphics sweep away to reveal text.

Text on screen: We hope you enjoyed this video, which is part of a series developed to support Ontario's kindergarten teachers in STEM education.

Be sure to check out other videos in this series along with additional classroom-ready resources and professional learning resources at OntarioScienceCentre.ca.

Animated graphics sweep away to reveal text.

Text on screen: Ontario Science Centre; An Agency of the Government of Ontario