Learning in Places

# Learning Frameworks

**Wonderings, "Should We", and Investigation Questions in Field-Based Science**

## Why are wonderings, "Should We", and investigation questions critical in field-based investigations and socio-ecological deliberation and decision-making?

Research has shown that when learner questions are centered in science activities, those questions can drive sense making and guide the formation of field-based investigations. Additionally, learner questions can offer insight into how they understand scientific concepts and, how they are making connections to personal experiences and/or family and community knowledges and practices. Making these connections visible is critical in the design of effective and equitable science learning environments. In order to support this, educators can model and scaffold how to ask questions that lead to ethical deliberations and decision-making about socio-ecological systems.

Although there are many other types of questions that learners and their families may ask, we focus on Wonderings, "Should We," and Investigation questions as important for scaffolding ethical deliberation and decision-making related to complex socio-ecological systems. We see these kinds of questions and this orientation towards wondering and deliberation as central to developing ethical science engagement both in early childhood and through the course of life.

# How to use this framework

**Learner Sense-Making:** Make space for learners to wonder and ask questions during outdoor and indoor learning activities. Encourage learners to bring wonderings and questions from family activities to the learning environment. Ask learners to elaborate when they pose a question to help uncover ideas that may not be initially visible. The wonderings and questions that learners pose can offer insight into personal connections, and/or family and cultural knowledges and practices. "Should We" questions should stem directly from student wonderings, and should be the connection between wonderings and investigations.

**Collaborative Practice:** Learners and educators should work collaboratively to ask questions in order to build knowledge in the classroom and to figure out what phenomena to investigate. Educators should make wonderings and questions visible, and help learners make connections and build upon other ideas. Additionally, educators can create cross-learning environment collaborations by sharing "Should We" and Investigation questions with families and other educators to get input or connect to other ongoing investigations.

**Co-Design and Assessment:** Use this framework to guide your co-planning with other educators by continually revisiting learner wonderings and questions. Bringing a list of learner and family wonderings and questions to co-design sessions will help you and other educators assess what practices and knowledges are being surfaced in the classroom, as well as what instructional moves you will need to consider to continue to support learners' wonderings and question asking. Share "Should We" and investigation questions, and help each other design investigations that will support learners' explorations of, and ultimately their deliberations and decision-making about, these questions.

**Planning and Implementation:** When planning instruction, implementing plans, and reflecting on how these plans unfolded during instruction, think about where and when space was made for learners to generate, share, consider, and explore wonderings and questions. Some things to think about include: a) how will you track and make visible the myriad of wonderings and questions? b) how will you help facilitate connections across these wonderings and questions to help learners generate "Should We" and related Investigation questions? c) how are learners making connections to phenomena that have meaning for their families and communities.

**Educator Reflection:** Reflect on your own practice related to authentically centering learner and family wonderings and questions in your instruction. Identify if and how you create a space to incorporate learner and family wonderings into your learning environment, and into your instruction. Reflect on the kinds of "Should We" questions you ask and make decisions around every day. Try to think about the positions from which you make those decisions--as a parent, a teacher, a caretaker? What information did you need to gather in order to make those decisions? Reflect on the process of how "Should We" questions can be explored beginning with the generation of investigation questions that will guide learners' investigations and ultimately, their ethical deliberation and decision-making about their "Should We" questions. Identify supports you might need to help you support learners as they engage in wondering, sense-making, question generation, investigations, deliberations, and decision-making.

**Connections to expert thinking:**
Wonderings and questions are central to all scientific endeavors. Wonderings lead to scientific questions.These questions guide research and investigations, and in turn generate more wonderings and questions! For example, an ecologist will often observe and wonder about phenomena in the world before engaging in field research. This endeavor may be driven by personal histories, values and ethics in their home communities, and current directions in the scientific field. Importantly, all science is a cultural endeavor, and the types of questions that are asked, and linkages to sense making and deliberations, have implications for decisions about socio-ecological systems.

# Wonderings, "Should We", and Investigation Questions Framework

## Wonderings

Wondering is central to sophisticated scientific field-based observation and questioning. Observations generate curiosity, wonderings, and questions that open up opportunities for learners to engage in speculative thinking about possible relationships, drawing their attention to the unknown. Wondering helps learners consider a broader range of human and more-than-human perspectives when making sense of the values underlying deliberation and decision-making processes. **Who gets to wonder, and whether or not these wonderings are taken up in a learning environment, is a deeply powered and historicized act.** Paying attention to wonderings and letting them guide activities in learning environments makes space for learners to not only be heard and centered in investigations, but also leads to ethical deliberations that are personally meaningful to learners' and their families and communities. A focus on wondering in field-based science contexts opens up space for learners to deliberate and ask questions about the roles and responsibilities of humans within the natural world. Wondering is essential to ethical decision-making and considering what possible futures we imagine, what actions we should take, and what values guide those actions. When a learner asks, "I wonder who put this wall here?", opportunities arise to imagine both past and future actions, perspectives of more-than-humans, and past roles and future responsibilities of humans. In this way, and with facilitation, wonderings lead to questions that form the basis for "Should We" questions.


There are many types of wonderings present in learning environments. These categories differentiate the many forms that speculative activity might take across the field-based science storyline:

- **Wondering about** expresses curiosity to know more about phenomena, processes, or relationships. Reflecting standard approaches to science education, wondering about involves questions such as: How does it work? What would happen if? Why does X do Y? Wondering about motivates learners to find out more within a particular framework through exploration of "known unknowns", or pieces of information they become aware of not yet understanding.
- **Wondering at** captures our capacity for wonder and awe through affective responses to the world and our place within it. When learners wonder at, they are caught up in experiences of puzzlement or amazement that can be difficult to put into words. This is often reflected in exclamations "Woah, that's so cool!"; "Oh my goodness, look at all those colors!" or in moments of non-verbal contemplation such as a child's excited response to placing their hand in cold water or running their hands repeatedly on the smooth trunk of an Aspen tree.
- **Wondering whether** involves deliberation on possible actions: What to do, what could be done, or what one shouldn't do given a particular situation. Central to developing deep should-we questions, wondering whether involves scientific speculation that explores moral and ethical judgements, involving questions such as: Why is this important? What should we do? Is this right? Who does this impact? These questions often reflect value judgements, taking up concepts of good vs bad and right vs wrong as learners deliberate on the socioecological tradeoffs of a given course of action.
- **Wondering with** is speculative activity about human-nature relationships that recognizes the agency of the more-than-human world, positioning them as active partners in thought and conversation as investigations unfold. This involves discussing natural kinds in ways that recognize their personhood and capacity for decision making through perspective taking and speculation on their internal states ("If the seeds are baby trees, than the seedpod is the womb" or "I wonder why the nettle decided to all live together in this hillside" or "What kinds of stories might Cedar tell us about her time living in this place?"). Starting from the assumption that the natural world can be both addressed and answer our wonderings, wondering with refuses the objectification of nature and foregrounds the complex interdependence of all life forms through positioning humans a part of the natural world (rather than separate from or more important than).

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## "Should We" Questions

Asking "what should we do," and deliberating in order to make a decision is something that all people do every day. Deliberations and decisions can be informed by personal experience, values and beliefs, cultural norms, social networks, and evidence from a myriad of other sources. In field-based science, deliberating and then making decisions involves utilizing knowledge, clarifying values and goals, and exploring potential impacts on humans and more-than-humans, at micro and macro scales, across multiple timescales, and from powered positions. Socio-ecological "Should We" questions (1) explore relationships between humans and the natural world, (2) explore multiple possibilities and how each possibility could impact families, communities, and the natural world, and (3) encourages us to make more ethical and accountable decisions within the natural and social world. "Should We" questions ask us to think about scales of time, including seasons, and processes of change. They ask us to take on others' perspectives and ask, "who would we help with our decision? Who might we harm?" "Should We" questions require deliberation and action even with uncertainty. "Should We" questions require that we think about power and historicity as part of our deliberations and decision making. Asking "Should we" questions as part of science learning is important because they:

- center social *and* ecological (socio-ecological) systems in deliberations and decisions;
- stem from learner and family wonderings;
- give purpose, direction, and cohesiveness to subsequent investigation questions;
- create spaces for learners and their families to *reason & deliberate* about socio-ecological systems and decisions by using observations and evidence;
- create space for *ethical decision-making* around nature-culture relations.

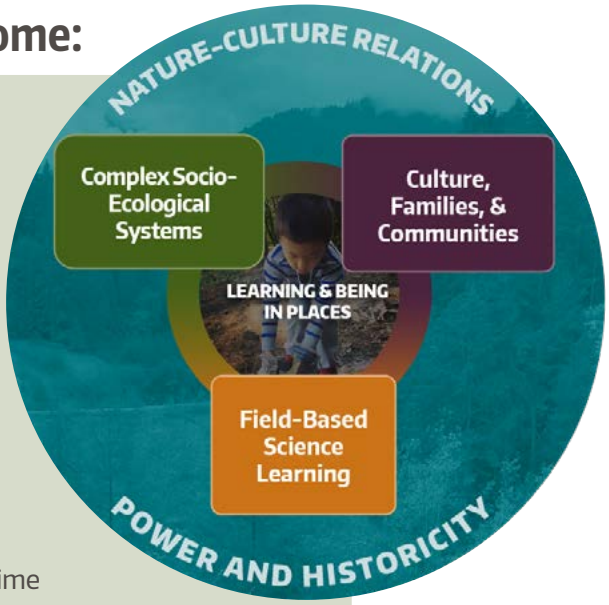

## Investigation Questions

Investigation questions about the social (human) and natural world (more-than-human) are a unique type of question that can be explored through systematic observation and other field-based science methods to better understand related phenomena. Scientists collect and then analyze data and utilize evidence from that work to interrogate their questions and model relationships, which include generating more questions that lead to more investigations! In Learning in Places, investigation questions highlight what needs to be better understood in order to propose an answer to a "Should We" question. This process of planning and carrying out investigations enables movement from initial ideas about phenomena related to learners' "Should We" questions, to making claims from evidence about those phenomena in preparation for ethical deliberations and decision-making related to "Should We" questions. Investigation questions are important because they support learners and educators:

- as they plan investigations, including the use of data collection protocols and other instrumentation, that will allow them to explore their investigation questions and make claims about phenomena they are studying.
- to collect a robust data set including field observations and measurements, conversations with community and family members, and explorations of various media, such as books, podcasts, articles. Through subsequent data analysis, learners and educators generate patterns that help them make claims about the phenomena in which they are interested.
- by ultimately contributing to ethical deliberations using their data and their analyses of those data to make decisions about their "Should We" question.

**In Learning in Places, investigation questions highlight what needs to be better understood in order to propose an answer to a "Should We" question**

# Connections to the Learning in Places Rhizome:




**Complex Socio-Ecological Systems:** Socio-ecological systems refer to the interactions between human systems and ecological systems. The underlying premise is that humans are part of the natural world, and all of our systems (e.g. social, political, institutional) are always in relationship with ecological systems. Educators should incorporate wonderings and scaffold how to ask "Should We" and investigation questions that explore wonderings and support sense-making about complex socio-ecological systems. Educators can do this by building on the wonderings and questions that learners, their families, and their communities are asking, and helping them to deepen and/or reframe in ways that make explicit connections to socio-ecological phenomena. Ultimately, "Should We" questions should prompt learners to investigate or think about phenomena across multiple time scales or spatial scales.

**Nature-Culture Relations:** While asking various types of questions is an important part of science education, it is also a practice that varies across cultures. The questions that learners or families raise can offer insight into issues that matter to them or their communities. For example, when thinking about nature-culture relations, "Should We" questions can also prompt learners to think about their own connection to natural and social systems. For instance, how do learners' wonderings, "Should We," and investigation questions lead to ethical deliberation and decision-making that recognize that humans are part of the natural world? How do these questions explicitly or implicitly connect to family and cultural knowledges and practices?

**Field-Based Science Learning:** Conducting field investigations and constructing explanations from evidence are foundational to field-based science learning. Wonderings, "Should We," and investigation questions drive the field investigations, help learners make sense of phenomena, and lead to new questions. It is important to note that even if learners' or families' questions seem unrelated to science investigations, educators should not make that assumption. Instead, educators should further explore these questions with learners and families so that connections among phenomena and initial questions are visible and so that educators understand how these questions are personally meaningful to learners and families and/or connected to larger socio-ecological systems.

**Power and Historicity:** Who gets to wonder and ask questions, and whether or not these are taken up in a learning environment, is a deeply powered and historicized act. Power is embedded in all relationships; between individuals, between individuals and institutions, between institutions and communities, and so on across time (historicity). This power shapes interactions between peers and between adults and young people routinely in learning environments in ways that can hinder or facilitate genuine curiosity and scientific questioning, particularly for those whose knowledges and inquiry practices do not mirror dominant ones. For example, research demonstrates that very young learners come to school with many questions, inquisitiveness, and personal interest; however, routine interactions, such as assessment, in schools shift young peoples' thinking and discourse towards (re)producing known right answers to questions posed by an adult or privileged peer. Or the types of questions that drive learning and instruction solely mirror Western knowledge systems and maintain intellectual power with privileged adults and learners. Educators should make explicit connections to all learners' wonderings and questions over time and across learning places (i.e., indoors, outdoors, and in homes and communities), which can support learners seeing their ideas and questions as generative to their own and others' learning. Additionally, educators can learn more about heterogenous deliberation and decision making practices in learners' homes and communities to develop a range of culturally thriving question asking practices that may look different than school-based questioning practices.

# Appendices

The following appendices provide examples and other supports to help educators use and then deepen their use of the Wonderings, "Should We", and Investigation Questions framework over time. Appendix A is a vignette that showcases one example of how a teacher used this framework. Appendix B provides example questions and scaffolds that educators can use in supporting learners' sense-making and decision-making, in ways that connect to family and community practices as well as to the seasonal storyline. Appendix C is a self-assessment that educators can use to reflect on their current practices, as well as identify practices that they want to learn how to deepen in their teaching.

## APPENDIX A

PLANNING: Ms. Loretta's class is using the Learning in Places Seasonal Storyline for Field-Based Science Education. Learners in her class have gone on a couple classroom and family walks and now need to decide on a "Should We" question. During their wondering walks they explored the field near the school, what was growing along the sides of the building, and walked along the perimeter of the school. They also talked about how the school is planning to build a new garden and were wondering where they were going to get the water from. Ms. Loretta knows that the "Should We" question is supposed to stem from learner and family questions, and from wondering walks and other classroom activities, but learners and their families have generated many questions and some of them are quite broad! How can she and her learners possibly narrow all of these questions down to one "Should We" question? Ms. Loretta feels that learners and families had a lot of interesting questions, but many of them don't seem to be related to one another. For example, while their class was outside, Ms. Loretta heard learners wondering why there were so many fallen branches on the ground, and other learners were looking at bugs and wondering why they were under leaves or on wet logs. Ms. Loretta also heard some learners asking questions that seemed completely unrelated to the wondering walk, like "Why are we going outside when it's raining?", or "Why did someone leave a dog poop bag on the side of the trail?". In looking through questions generated by families there were a range of wonderings, such as, "Who was moving into the new apartment in the neighborhood?", or, "Why is the bark different colors on a tree?"

**Ms. Loretta wants to let the learners guide the inquiry, but isn't sure how to do that.** She realizes that she will have to scaffold the next discussion, and decides to come up with some ideas about "Should We" questions that relate to phenology and connect to dimensions of socio-ecological thinking. She decides to first sketch out how learner questions are related to the Socio-Ecological Histories of Places Framework to make sure that she facilitates a discussion that is collaborative and connects to family and scientific thinking. Ms. Loretta brainstorms two very different potential "Should We" questions based on what she saw in the families' wonderings, and what they have talked about during their wondering walks. Some of the themes she heard from learner and family questions were about relationships among water, bugs, and people; noticing plant structures in the trees near home; and also some human decisions around building a garden. She thinks about a couple possible "Should We" questions: "Should we use water from the local stream to water our gardens?"; "Should we plant a native plant garden along the perimeter of the school?"

IMPLEMENTATION: Ms. Loretta gathers the class in front of the family and learner questions and wonderings. Prior to the class, she decided that **she would scaffold the class in organizing the questions into groups**. One learner, Amara, who is typically shy and doesn't always want to participate in class activities, says she just wants to focus on her own question, "Why does the forest look messy?". **Ms. Loretta asks her to clarify what she means by this question**, and Amara responds by saying that in her neighborhood there are only a few trees along the sidewalk, and she never sees branches or leaves on the sidewalk. When they are in the woods near the school, there are branches and sticks and fallen trees everywhere and it looks messy. Ms. Loretta **thanks her for clarifying, and repeats what she thinks she hears in this question**: Amara

is noticing the relationship between an area with lots of trees and branches and "woody debris" (a term she introduces to the class) on the ground; Amara is also noticing that in neighborhoods where there are sidewalks and more buildings, there is less woody debris on the ground. Ms. Loretta asks if anyone else in the class noticed this, and several learners raise their hands. One learner shares that in his neighborhood, there are no trees but there are lots of buildings. Another learner shares that she has lots of trees in her yard. Ms. Loretta shares that Amara's question is similar to many of the other questions because it is about **Relationships and Human/Plant/Animal Behaviors**, dimensions of socio-ecological thinking.

CONNECTING TO FAMILY AND COMMUNITY KNOWLEDGE AND PRACTICES: At first Ms. Loretta didn't know what to do with the questions families had on their walks. They seemed unrelated to what the learners had wondered about on their walk in the woods by the school. But when she asked Amara to clarify what she had meant by her question "Why does the forest look messy?", Ms. Loretta realized that Amara was **making connections between what she had noticed during the class walk and what she notices when she's at home**. Ms. Loretta then asked other learners to make this connection as well. S**he realizes that she should know more about the neighborhoods that learners live in**. Since she lives farther away, she is not very familiar with the neighborhoods surrounding the school. Ms. Loretta decides that she wants to organize, or get involved in, a neighborhood walk to get to know the area better.

REFLECTING ON INSTRUCTION: Ms. Loretta was nervous about deciding on a "Should We" question for the class. She wanted the question to emerge directly from the learner questions, but realized that she needed to help scaffold the class to a "Should We" question that incorporated socio-ecological dimensions and that was connected to phenology. This was a balance between letting learner ideas lead the way, and guiding the direction of the class' thinking.

In this vignette, Ms. Loretta knows that learner questions should be central in the storyline, but it is a challenge at first to make sense of all of the different types of questions that learners and families have. She decides to reference some of the other frameworks, such as the Collaborative Discussion framework to help her facilitate conversations in class that center learner questions, and the Socio-Ecological Histories of Places framework to see how the questions are (or can be) related to dimensions of socio-ecological thinking, such as different time scales. She also realizes that she has to do some scaffolding as well; she needs to build on learner ideas, but also to help learners see how to make connections between what they're wondering about and how to investigate and explore their questions.

## APPENDIX B

### Examples of Learner Thinking Related to Wondering or Asking Questions

The following two transcript segments (example 1 and example 2) are from outdoor walks with elementary school students. During these walks, adults and children wondered, asked questions, and deliberated about their observations. The following example took place at the launch of a "wondering walk", and is one way that adults can scaffold children's wonderings through multiple observations.

**Example 1: Outdoor Facilitation**

| | | |
|---|---|---|
| 1 | Adult: | I'm noticing lots of leaves on the ground, I'm noticing leaves up in the trees, I'm noticing leaves on |
| 2 | | plants... I'm wondering, how do you know that it's winter? When you think of leaves, when you look at |
| 3 | | leaves, what makes you think it's winter? |

Notice how in only one turn at talk she models how to build a wondering from direct observations in the place they are in. Importantly, her observational noticings move across multiple spatial scales (down on ground, up in trees, around on plants) while also making direct connections to overarching socio-ecological systems (seasons and phenology). It is important to understand how adults model particular sensemaking strategies through narrating the connections between observations, wonderings, and questions that connect to other socioecological dimensions.

In the next example, the group has noticed a piece of bark on the side of the trail and become curious about where it came from. What is presented as a simple yes/no question gets reframed as part of an ongoing investigation that the group is actively wondering about. This reframing then prompts speculation and new questions that continue to drive activity over the course of the walk.

**Example 2: Reframing Student Questions**

| | | |
|---|---|---|
| 1 | Student 1: | Did that [pointing to bark] come from a tree? |
| 2 | Adult: | You know, I'm wondering if it did. That would be pretty exciting. I wonder what kind of tree it would |
| 3 | | come from. I'm, you know what... I'm curious - Here, I'll hold it as you walk, okay? |
| 4 | Student 1: | Okay. Down by the helicopter tree, I think it came from that. |

This student's interaction with this place has evoked curiosity in knowing more about the relationship between the bark and where it came from. Leveraging wonder, the adult here then responds by positioning herself as both curious and excited to continue investigating. The emotional affect of excitement and curiosity here is deeply pedagogical in modeling how personal connections can motivate field-based wondering, questioning, and investigation. Responding in kind, the student then suggests a forward trajectory through which the investigation might unfold. The final transcript segment comes later in the walk as the group continues to investigate fallen tree parts.

### Example 3: Reframing Student Questions

| | | |
|---|---|---|
| 1 | Student 1: | I wonder what kind of tree that broke from |
| 2 | Adult: | What kind of tree it broke from? How would we go about answering that question? How would we, if |
| 3 | | we were curious about what tree, what type of tree that came from? |
| 4 | Student 2: | I got it from... the tree from over there. |
| 5 | Adult: | So we might go back over where we were before and try to see, because there's a tree that has some |
| 6 | | bark like this. I'm wondering if, maybe, maybe not with snails on them... |
| 7 | Student 1: | Not these kind of trees. |
| 8 | Student 3: | Then maybe it could be a log or stick? |
| 9 | Student 1: | A log or tree or... |
| 10 | Adult: | A log or a tree... |
| 11 | Student 3: | [Student 2], did you see any logs or trees nearby? |

Taking up the modeled shifts towards wondering in the previous segment, Student 1 poses her wondering in a way that suggests a single known answer. Clarifying and shifting focus instead to processes of investigation, the reframing here engages the group in a series of reflective and speculative sensemaking that results in retracing their steps and comparing features of what they have found to the places they are moving through. Following this segment, this series of moves builds into a sophisticated investigation where learners begin to notice new relationships between the trees around them and what has fallen to the forest floor. Consequentially, while learners gather various small tree parts (e.g. seed pods), they also deliberate about whether or not they should bring these materials inside or leave them outside, connecting their initial wonderings to everyday decision making practices.

### Example 4: Wondering With

| | | |
|---|---|---|
| 1 | Student: | Let's keep walking and see... |
| 2 | Adult: | They almost look like little babies, don't you think? |
| 3 | Student: | Like how they're attached? |
| 4 | Adult: | So I have two kids. And when they were in my tummy there was a cord that connected them. And |
| 5 | | when they came out we had to- |
| 6 | Student: | - Cut the cord? |
| 7 | Adult: | Cut the cord - and so it makes me think of these as like the- |
| 8 | Student: | - Little babies? |

| | | |
|---|---|---|
| 9 | Adult: | The trees. That's the trees womb. And then these little babies ones are... |
| 10 | Student: | Look at them. Seeds like when somebody's in your belly you have something attached to them and |
| 11 | | then seeds that they have something attached too. |

During this walk students begin to notice and observe a variety of seed pods scattered around the trail. As this investigation emerges and is carried forward, seed pods become the focal phenomena of observation, wondering, and questioning. As students begin to notice the characteristics of different seed pods, an adult facilitator models the practice of wondering with through observations and open-ended questions that position tree seeds and human babies as complementary and non-hierarchically related to one another. In this short exchange, scientific observations of the form and function of seeds connected within their pods is directly compared to little babies whose umbilical cord is attached and sustains their early life. Through this positioning, the personhood of seedpods begins to be recognized as humans as positioned as kin to the rest of the natural world. Later on in their activities, seed pods and other fallen plant part become central to this class' should we question and investigations as they deliberate on: "Should we remove fallen plant part from the ground?"

## APPENDIX B

### Teacher Guide for Questions in the Storyline

How to Support Question Asking Throughout the Storyline

1. Contextualization: Help learners see how their questions are contextualized in a shared phenomena
2. Scaffolding Sense Making: learners and teachers are critical players in asking questions that are productive for investigations
    - A key role of teachers is asking the kinds of probing questions that support learners in thinking more deeply and wondering about things they take for granted.
    - Model asking questions: When learners make observations or share wonderings, ask questions about their ideas and model that there are interesting questions to be figured out and explained.
    - Normalize uncertainty: Teachers can model acceptance of the unknown in ways that encourage ongoing processes of investigation and sensemaking through questioning.

### Types of Questions and Reasoning Forms they Support

Above, we outlined wonderings and two major types of questions in the storyline, "Should We" and Investigation questions. However, there are many types of questions that learners may ask throughout the storyline that either reflect personal connections or family and community knowledges practices. In other words, questions often do not fall neatly into a single category, but represent learners' sense-making and complex thinking about phenomena. How educators and other learners respond to and extend learners' questions will shape the classroom culture around question-asking. Deliberate and routine reflection about whose ideas are taken up in the classroom as the investigation unfolds will be a necessary part of designing equitable learning environments where heterogeneous ideas and question asking styles are supported.

| Type of Question | Questions in the Classroom | Questions in the Field |
|---|---|---|
| Clarifying Questions and Statements | I don't understand...<br>What do you mean by...<br>(elicits learner understanding, identify what learners need to figure out) | What do you mean when you say 'stickyweed'?<br>I don't understand how to observe what's under a plant. |
| Exploratory questions | How does...<br>Why does...<br>How come... | Why does the spider use a web?<br>How come we don't see slugs today? |
| "Should We" questions | Should we... | Should we remove ivy from the trees?<br>Should we use soil from the forest in the garden? |
| Predictive Questions | If ...then<br>Will ...?<br>What if... | Will the bird be here tomorrow?<br>What if the ivy stayed for 10,000 years?<br>If people remove the branches, what will happen to the slugs? |
| Relational Questions | How is this related to ____?<br>What does the relationship between ___ and ___ mean for ____? | Why am I noticing more bugs on wet logs but not dry logs? What is the relationship between bugs and logs? |
| Connecting Questions | How does what you are talking about connect to your experience with family?<br>How does your experience connect with the seasons?<br>How does your question connect with [another learner's] question? | How is what you are you noticing similar or different than what you noticed with your family? What is similar or different?<br>How is this [phenomenon] connected to [same phenomenon] in [different location]?<br>Ex: You are noticing a lot of water pooled up on the trail here. How do you think this water is connected to the stream over there? How do you think this water is connected to the rain? |

**Related Tools in the Storyline:**

LE 4.7 Asking Questions from Our Wondering Walks - Classroom Tool

LE 5.1 Questions Arc - Teacher Tool

LE 5.2 Organizing Wonderings towards a "Should We" Question

# APPENDIX D

## Self-Assessment for Educators

Use the following self-assessment to reflect on the educational practices you currently use related to supporting Wondrings, "Should We", and Investigation questions, and to identify those practices that you want to begin to use. Return to this self-assessment periodically to continue to reflect on your educational practices as a way to deepen them.

### Which of the following do you incorporate into your teaching practice?

| Dimensions of Practice | Yes! | Some! | Not yet! |
|---|---|---|---|
| I incorporate learner and family wonderings into classroom discussions. | | | |
| I encourage learners and families to deliberate and ask questions about the roles and responsibilities of humans within the natural world. | | | |
| I consider and incorporate learner and family wonderings in coming up with a "Should We" question. | | | |
| When making socio-ecological decisions, I incorporate multiple perspectives by connecting to practices and knowledges from learners, families, and their communities. | | | |
| I clarify values and goals, and explore potential impacts from multiple human and more-than-human perspectives, when considering decisions. | | | |
| I consider how possible decisions tied to "Should We" questions could impact families, communities, and the natural world, and how different decisions might impact those entities differently and why that might be. | | | |
| I support learners and families in asking investigation questions related to their "Should-We" questions, including analysis and interpretation of data that was collected in field-based investigations. | | | |
| To help learners and families explore and deliberate about their "Should We" questions, I incorporate other research, such as conversations with community members and explorations through the use of media, such as books, podcasts, articles, about what is already known. | | | |

### Reflection questions:

1. What 3-4 practices am I doing well right now?

2. For my answer to #1, what challenges did I encounter that I needed to address in order to succeed?

3. What 3-4 practices do I want to work on to deepen my practice around wonderings, "should we," and investigation questions?

4. What supports might I need to incorporate these practices into my everyday routines?

## Suggested Citation

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