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### Part 2 Week by Week

Components in each week follow in this order:

At a Glance

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All needed masters are found directly following the corresponding lesson.

### Arc of Unit 4: Communicating with Sound and Light

### **Big Ideas**

- Vibrating materials make sound. Sound makes materials vibrate.
- Materials interact with light in different ways.
- Light and sound travel.
- Humans and other animals communicate with light and sound.
- People innovate and invent to solve problems.

Unit Question: How can we use sound and light to communicate messages?

	WEEK 1	WEEK 2	WEEK 3	WEEK 4
Weekly Question	What is sound?	How do sounds change?	How do people and other animals use sound?	What is light?
Texts	The Sound of Silence Max Found Two Sticks Sounds All Around	Amazing Sound "Way Down in the Music" Comparing Marimba Texts	"The First Music" Amazing Sound Sounds All Around "How Animals Use Sound"	Sending Messages with Light and Sound All About Light Oscar and the Moth
Science and Engineering	Exploring Sound Exploring Sound 2	Changing Volume Changing Pitch	Sound Receivers Echolocation	Light is Energy Lights Interactions with Materials
Studios	Making, collecting, and representing sounds with a variety of media, across studios	Activities continue, with extensions; reviews of Unit 4 books	Activities continue, with extensions	Exploring, responding to, and representing light with a variety of media, across studios
Writing	Procedure	Procedure	Procedure	Explanation
Phonics	Follow guide	Follow guide	Follow guide	Follow guide

### Arc of Unit 4: Communicating with Sound and Light

	WEEK 5	WEEK 6	WEEK 7	WEEK 8
Weekly Question	How does light change?	How do people use light?	How do inventors and innovators make a difference?	How do new ideas contribute to our community?
Texts	The Shiny Sculptures of Anish Kapoor Keep the Lights Burning, Abbie	Introducing the Look and Listen! Project  Rosie Revere, Engineer  "Inventors!"  "Lewis Latimer and the Long-Lasting Light Bulb"	Marvelous Mattie End of Unit Assessment The Lizard and the Sun	The Lizard and the Sun Follow the Moon Home Synthesizing Unit Ideas
Science and Engineering	Light and Shadows Mirrors and Beams	Making Rainbows  Communicating with Light	Charting Daylight Measuring Time	none
Studios	Activities continue, with extensions	Look and Listen! Project introduced	Look and Listen! Project work continues with trials and feedback cycles	Projects are revised and prepared for presentation
Writing	Explanation	Explanation	Explanation	Explanation
Phonics	Follow guide	Follow guide	Follow guide	Follow guide

### **Unit 4: Communicating with Sound and Light**

### **Big Ideas**

Vibrating materials make sound. Sound makes materials vibrate.

Materials interact with light in different ways.

Light and sound travel.

Humans and other animals communicate with light and sound.

People innovate and invent to solve problems.

In Unit 4, children build and harness scientific knowledge about how sound and light work. They ask questions about what they sense in their environment and about communication. Learning is focused on **sound** during Weeks 1-3 and on **light** during Weeks 4-6; children explore how each phenomenon is produced, can change or be changed, and is used by people and other animals. Children draw on their knowledge of animal structures from Unit 2 and their own experiences in the world to ground these otherwise hard-to-reach understandings.

Children who have vision and/or hearing challenges will need extra special consideration throughout this study, according to their specific experiences and the technologies they use.

Science and engineering are very much in the foreground of this study. To build their understandings, children play with and develop questions about the phenomena of sound and light, build vocabulary, and *then* interact with informational text; messing around precedes direct instruction. Rather than dive into discussion of intangible waves of sound and light, children *do* to have, compare, and analyze experiences, and then apply what they have observed and learned.

Children also continue their exploration of weather, which has been threaded throughout the year.

In the beginning weeks of Writing, children write procedures to teach a chosen audience how to build an instrument. Beginning in Week 4, children move into a new genre, Explanation, writing to explain how sound travels.

Beginning in Week 6, the study focuses simultaneously on the notion that sound and light are communication tools and on invention and innovation. Children learn about people who design to improve our daily lives, and about inventions and innovations in light and sound. The Look and Listen! Project then invites children to become inventors and innovators themselves,

challenging them to design and build tools that can be used by children to communicate using either light or sound in specific contexts.

The pandemic required all of us to adjust our ways of being in touch with each other. This unit provides an opportunity for increasing connectedness through innovation and play. Stuck in an apartment while someone else is working or sleeping, what ways can we find to communicate silently from one room to another? What signals and new languages can we develop to convey certain kinds of messages? Can we communicate with someone outside our windows, on the sidewalk, or in a neighboring building? Is there a way to use light or sound to enhance communication through computer screens? Max the drummer and Addie the lighthouse keeper are two characters from unit texts who help us think about how we communicate beyond our regular habits of spoken language.

Unlike in previous units, no days are specifically reserved for an end-of-unit celebration; most classrooms and schools host end of year festivities of some kind, and a Sound and Light presentation about children's learning can be included then.

### **Preparation**

Set up good-quality **audio technology** for Text Talk lessons, especially in the first three weeks. In addition, some elaborations and prompts for Weekly Words include audio and/or video resources.

As in previous units, recycled materials will be of use, especially those that might be used to make musical instruments and those that react with light in interesting ways. Continue to collect **Beautiful Stuff** with families and around the school.

### For building teachers' background knowledge:

Consider what you already know and think you know about how sound and light work. Then find out more. Start by reading through all of the unit texts, and then extend your own knowledge so that you are able to answer children's questions and respond accurately to misconceptions.

This pair of lessons for older learners provides a great path for teachers to build knowledge:

### **How Light Moves** (PBS)

(https://mass.pbslearningmedia.org/resource/lsps07.sci.phys.energy.lplightmoves/how-light-moves/)

### Sound Vibrations (PBS)

(https://mass.pbslearningmedia.org/resource/phy03.sci.phys.howmove.lp\_sound/sound-vibrations/)

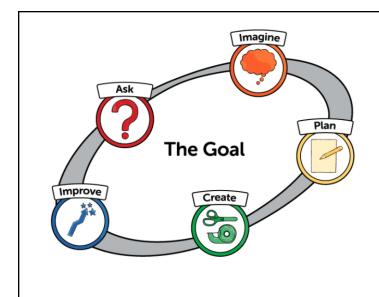
### **Look and Listen! Project Overview**

What if you were four years old, you had an important message to convey, and you had to use light or sound to get the message out to others? The Look and Listen! Project aims to solve exactly this problem.

Drawing on their experiences first with sound and then with light, considering what they have learned about the ways sound and light can change and how they can be utilized as tools of communication, the first graders contribute meaningfully to the learning and experiences of younger children. They are challenged to design and build a tool that helps young children communicate by one of these two means; they then introduce their tools to children in Preschool or Kindergarten.

Before beginning to build, the children must decide on a message to convey (one that would be of importance to a younger child, such as a message of love, an alert to danger, a signal to act), determine the physical conditions under which that message might be conveyed (distance, time of day, obstacles), and whether sound or light would be a more effective and interesting conveyance. Then they begin to plan, independently, with a partner, or in small groups. The whole group acts as a forum for receiving feedback, and other children/groups administer trials. The tools improve. And finally they are presented.

The framework for the Look and Listen! Project is the Engineering Design Process from *Engineering is Elementary*:



### **Engineering Design Process**

**ASK:** What is the problem? How have others approached it? What are the constraints?

**IMAGINE:** What are some solutions? Brainstorm ideas. Choose the best one.

**PLAN:** Draw a diagram. Make lists of needed materials.

**CREATE:** Follow the plan and create

something. Test it out.

**IMPROVE:** What works? What doesn't? What could work better? Modify the design to make it better. Test it out.

### The Final Products

The children's primary audience for this project is children in Preschool/Kindergarten in their own school community. The tools themselves will be given to those children to use.

In addition, children can work independently of or continuing with their partners or small groups to communicate something about their tool to either the Preschool/Kindergarten audience or to a different audience. Some possibilities for communicating about projects include:

Writing a **story** that features use of the communication tool.

Creating a carefully labeled diagram of the tool.

Writing a **procedure** for using the tool.

Creating a **pamphlet** to accompany the tool, explaining how its use might be affected in different situations or weather conditions.

Writing a sound or light poem.

Writing a biography or autobiography of one of the classroom inventors.

Painting or drawing a **self-portrait or group portrait** of the tool's inventor(s).

Creating a **3-dimensional representation** of how the message travels with Beautiful Stuff.

Creating a play about using the communication tool.

Making a **poster** to advertise the tool as a new invention or innovation.

This list is not exhaustive. Children and teachers will devise ways to tell others about these tools that respond to skills children have developed and media they wish to continue exploring and refining.

### **Preparation and Collaboration**

Because the project happens primarily during Studios, make sure the class schedule includes robust time for this component.

### By Week 4:

- Meet with preK colleagues to describe the project. The 1st Grade for ME curriculum includes a study of light and shadow; learn what questions the four year olds have pursued and what discoveries they have made about light. Ask about their experiences with and interests in sound. Be sure to find out whether any children in the group may be distressed by loud noises or flashing lights, and whether any children are hard of hearing or have a visual impairment.
- Coordinate with Preschool/Kindergarten and other first grade colleagues to pair or group classrooms. Plan a date, time, and format for presenting the tools to Preschool/Kindergarten classrooms.
- If the school does not include Preschool/Kindergarten classrooms, the audience might instead be a preschool in the town, or a Preschool/Kindergarten classroom in another school.

### *Before the start of Week 6:*

- Ask families to donate Beautiful Stuff, or otherwise collect those materials.
- Plan to document the design and development process (the *EiE* Engineering Design Process) to create an idea-to-product story for each group. Children can participate in this documentation by taking photographs, drawing, and writing at each step of the process; adults can document with photos, video, child interviews (predictions, surprises, puzzles, innovations), and observational notes.

### **Presentation and Celebration**

As part of other activities to wrap up the first grade year, display the light and sound communication tools in such a way that they can be tried out by visitors. Include documentation

of the design and development process along with the finished products. Allow children to decide much of how the end of year celebration of their learning unfolds.				

### **Studios At a Glance**

### **Unit 4: Communicating with Sound and Light**

	Art	Building	Drama	Library	Science & Engineering	Writing & Drawing
Week 1 What is sound?	Representing sounds in art	Making instruments	Collecting and acting out sounds	Sound search	Making sounds	Recording sounds
Week 2 How does sound change?	Continue	Continue, with extensions	Continue, add props for story acting	Book reviews	Changing sounds (continuing from science lessons)	Continue
Week 3 How do people and other animals use sound?	Drawing musicians	Continue	Telling, writing, and acting out stories about musicians and animals	Researching instruments and animal sounds	Creating a Listening Station	Writing new procedures
Week 4 What is light?	Making shadow puppets	Building a shadow puppet theatre	Telling, writing, and acting out stories involving light	Light Search	Exploring shadows with opaque, translucent, and transparent materials	Using storyboards to plan puppet stories
Week 5 How does light change?	Continue	Continue	Continue	Light and Sound Messages in books	Light Challenges	Writing and recording storyboard stories

	Art	Building	Drama	Library	Science & Engineering	Writing & Drawing
Week 6		All Stud	lios work develops fro	m classroom project p	lanning.	
How do people use light?	Refering to text to make detailed drawings of project ideas	Building initial models of communication tool designs	Acting out communication scenarios to assess designs	Researching inventors	Light Refraction	Writing and drawing stories including use of communication tools
Week 7 How do inventors and innovators make a difference?	Continue the Look and Listen! Project (introduced in Week 6, with structured work in Science and Engineering and Writing lessons).  Some possibilities for additional small group projects:  Writing a story that features use of the communication tool.  Creating a carefully labeled diagram of the tool.  Writing a procedure for using the tool.  Creating a pamphlet to accompany the tool, explaining how its use might be affected in different situations or weather conditions.  Writing a sound or light poem.  Writing a biography of an inventor-classmate or autobiography of oneself as an inventor.  Painting or drawing a self-portrait or group portrait of the tool's inventor(s).  Creating a 3-dimensional representation of how the message travels with Beautiful Stuff.  Creating a play about using the communication tool.  Making a poster to advertise the tool as a new invention or innovation.					
Week 8 How do new ideas contribute to our community?	Finalizing projects and preparing projects for presentation.					

### **Writing: Introduction to Procedure**

Building upon knowledge and experiences in Unit 1, children revisit procedure in Unit 4. Over three weeks, the class reviews the purpose, structure, and language of procedures before children write their own procedures. Children write procedures for Kindergarten students about how to build instruments. On Week 3, Day 5 children present their procedures to Kindergarten students. Arrange to partner with a Kindergarten class. Set up a time for the classes to be together, and for the first graders to share their work with Kindergarten students. Consider forming strategic partnerships of Kindergarten and first grade students.

### **Purpose**

The **purpose** of procedure is to give directions to accomplish a goal.

### Structure and Language

Procedures unfold in three **stages**. They begin with a **goal**, which names what the procedure sets out to accomplish. The goal can be included in the title, or written immediately after.

The goal is followed by a list of **materials**. (Some procedures, such as the yoga poses children examine, do not require a materials list, because the only necessary material is one's body.) **Adjectives** are included in materials lists to specify the number and kind of materials needed. Depending on the audience, lists of materials might be accompanied by images to provide greater clarity.

The materials are followed by the **steps**. In procedure, steps are numbered and follow one another in a list. They are not written in paragraph form. Each step begins with an **imperative action verb** and does not include additional words to indicate the subject of the sentence, such as "you." Steps also do not include connecting words such as "then" and "next." For example,

- 1. Jump your feet apart.
- Turn right foot out and left foot in.

**Adverbs** make steps more precise by describing how and where each action is to be completed.

Some procedures end with a **final comment**, which may include an evaluation of the procedure, or, in the case of science experiments, follow-up questions.

Unit 4 Introduction: Writing Procedure

### **Mentor Texts**

### Included in this Unit:

"How Many Am I Hiding?"

Chik Chak Shabbat by Mara Rocliff (Cholent recipe)

Yoga Pretzels by Tara Guber and Leah Kalish: Cobra

### Additional Texts to Consider:

recipes

### Vocabulary

accomplish: complete successfully

adjective: a word or phrase used to describe a person, place, thing, or idea

adverb: a word or phrase used to describe a verb

audience: an individual or group for whom a piece of writing is composed

directions: instructions

feedback: specific, helpful suggestions given to improve work

genre: a type of writing

goal: aim; objective; what someone wants to accomplish

**image**: a representation of something in the form of a drawing, photograph, etc.

imperative verb: verb that gives directions

materials: the items needed to complete a procedure

precise: exact; specific

procedure: a genre of writing whose purpose is to give directions to accomplish a goal

publish: to prepare writing for an audience

purpose: the reason for doing or creating something

revise: make changes to writing

stages: the parts of a piece of writing

steps: the actions taken to complete a procedure

title: the name of a piece of writing

verb: a word that expresses a physical action, mental action, or state of being

Adapted from Brisk, M.E. (2015). *Engaging students in academic literacies*. New York, NY: Routledge.

Unit 4 Introduction: Writing Procedure

### **Writing: Introduction to Explanation**

Explanation is a genre of writing that shares features with procedure and report. Over four weeks, children write to explain how sound travels. To prepare for writing explanation, the children build content knowledge about sound through the other components of the day, as well as through research during Writing lessons. In addition, they draw from other writing experiences to support writing explanation: sequential organization from personal recount and procedure; using adjectives from argument, procedure, and report; and drawing clear illustrations from procedure.

The final product in this unit is an accordion book created to teach children in Preschool/Kindergarten how sound travels. Considering this audience requires an emphasis on communicating through clear images, accompanied by concise written text.

### **Purpose**

Different types of explanations are organized differently and written for different purposes. The explanations written in 1st Grade for ME are sequential scientific explanations, whose **purpose** is to explain a phenomenon, in sequence.

### Structure

Explanations begin with a **phenomenon statement**, which names the phenomenon introduced in the explanation—in this case, how sound travels. After the phenomenon statement are the **explanation steps**, which are all of the steps needed to explain the phenomenon, written in order.

### Language

The children learn about **verbs** and **nouns** as they write explanations.

Explanations are written with **present tense action verbs**. The verbs are in the present tense because the phenomenon is happening now, and they are action verbs because they show what is happening.

The **nouns** in explanations are general, naming a group or class, rather than something specific. For example, an explanation of how sound travels talks about how all sound travels (in general), rather than the sound of a particular bell traveling (a specific example).

Unit 4 Introduction: Writing Explanation

### **Mentor Texts**

### Included in this Unit:

From Sheep to Sweater by Robin Nelson
From Cocoa Bean to Chocolate by Robin Nelson

### Vocabulary

action verb: a verb that expresses action

audience: an individual or group for whom a piece of writing is composed

explain: to describe in detail

**explanation**: a genre of writing whose purpose is to explain a phenomenon in sequence

**explanation steps**: the phenomenon explained, in order

feedback: specific, helpful suggestions given to improve work

general: naming a group; not specific

genre: a type of writing

**image**: a representation of something in the form of a drawing, photograph, etc.

imperative verb: verb that gives directions

medium: a form of communication

**noun**: a word that names a person, place, thing, or idea

**phenomenon**: an observable thing that happens

phenomenon statement: the beginning of an explanation, where the phenomenon is

introduced

precise: exact; specific

present tense: happening now

publish: to prepare writing for an audience

purpose: the reason for doing or creating something

research: to get information about something

**revise**: to make changes to writing **sequence**: in a particular order

stages: the parts of a piece of writing

tense: the form of a verb that specifies time

title: the name of a piece of writing

verb: a word that expresses a physical action, mental action, or state of being

Adapted from Brisk, M.E. (2015). Engaging students in academic literacies. New York, NY: Routledge.

Unit 4 Introduction: Writing Explanation

### Dear Families,

Our new study in first grade is called Communicating with Sound and Light. During the next eight weeks, your children will be learning about how sound works, how light works, and how we can use sound and light to communicate with others.

We'll start by exploring sound. Right away, we'll meet the character Max, in *Max Found Two Sticks*, and see how he uses those sticks to express his feelings. We'll find out what makes sound, listen to different kinds of sounds, and think about the sounds that happen all around us. Of course, we'll be thinking about music and musical instruments! And, building on our study of animals (Unit 2), we'll find out how humans and other animals use sound and think about why that is important.

Then we'll study light. What are shadows? What are reflections? How does light behave? Why is this important to notice? In the book *Oscar and the Moth*, a cat and a moth will help us think about light and dark. In studying both light and sound, we'll read texts that give us information as well as poems and stories.

In our writing lessons, your child will write a procedure to teach someone how to build an instrument. Then writing lessons will focus on explaining how sound travels.

After a few weeks, we'll learn about some inventors. Then the children will become inventors themselves! They will design and make tools that can be used by children and that help people communicate a message using light or sound. To do this, we will follow this Engineering Design Process:

### At home you could...

Talk about sounds you hear and how you notice people using light.

Listen to music! What music do you love?

Listen to sounds outside and around your home. What qualities do these sounds have? What makes them different from each other?

Try to make new sounds with objects you find around you.

When do you use light?
Why?
What kinds of light do you
notice around you, inside
and outside? Use words to
describe the qualities of the
lights you notice.
Try making shadow puppets
on the wall!

Practice giving step by step directions for how to do different kinds of things. Include the materials you need and every single step along the way.

Ask your child to give you step by step directions.

**ASK:** What is the problem? How have others approached it? What are the constraints?

**IMAGINE:** What are some solutions? Brainstorm ideas. Choose the best one.

**PLAN:** Draw a diagram. Make lists of needed materials. **CREATE:** Follow the plan and create something. Test it out.

IMPROVE: What works? What doesn't? What could work better?

Modify the design to make it better. Test it out.

Have you ever used a process like this to make something or solve a problem?

How can we use light and sound to communicate messages?

Is there a tool that you use in the kitchen or somewhere else around the place where you live that makes your life easier? What is it? Do some research with your child to find out about who invented it!

We will need lots of Beautiful Stuff for children to build and experiment with, especially small boxes, small cups or containers (plastic or paper), and different kinds of string. Thank you!

### Books we'll be reading in Unit 4: Communicating with Sound and Light

Find them at the library or online!

The Sound of Silence by Julia Guo and Katrina Goldsaito

Max Found Two Sticks by Brian Pinkney

Sounds All Around by Wendy Pfeffer

Amazing Sound by Sally Hewitt

Sending Messages with Light and Sound by Jennifer Boothroyd

All About Light by Lisa Trumbauer

Oscar and the Moth: A Book about Light and Dark by Geoff Waring

Keep the Lights Burning, Abbie by Connie Roop

Rosie Revere, Engineer by Andrea Beatty

Marvellous Mattie by Emily Arnold McCully

Now and Ben: The Modern Inventions of Benjamin Franklin by Gene Barretta

Snowflake Bentley by Jacqueline Briggs Martin

The Lizard and the Sun by Alma Flor Ada

Follow the Moon Home: A Tale of One Idea, Twenty Kids, and a Hundred Sea Turtles by Deborah Hopkinson and Philippe Cousteau

### What is sound?

## How do sounds change?

# How do people and other animals use sound?

### What is light?

## How does light change?

### How do people use light?

## How do inventors and innovators make a difference?

# How do new ideas contribute to our community?

### **Unit 4 Vocabulary List**

Week 1	senses: ways in which animals' bodies collect information about the world hear: to sense using ears
	motion: the action of moving or being moved
	listen: to hear and pay attention to sound
	identify: to name what something is
	pluck: to pull quickly, such as the strings of an instrument
	plack. to pair quickly, sach as the strings of all instrument
Week 2	soft: quiet
	property: how an object looks, feels, sounds, or tastes
	detect: to notice or sense
	volume: how loud or soft a sound is
	vibrate: to move quickly back and forth
	<b>strum</b> : to play a string instrument by sweeping the thumb up or down the
	strings
Week 3	communicate: to share information, news, ideas, or feelings
	<b>produce</b> : to make
	effect: a change that happens because of an action
	amplify: to increase the volume of sound, to make sound louder
	<b>key</b> : small bar or button of an instrument that is pressed to produce or
	change sound
	pitch: how high or low a sound is
Week 4	beam: a ray of light
	<b>shadow</b> : the dark area that is produced when an object comes between a
	light source and a surface
	location: place
	source: a place, person, or thing from which light or sound comes
	block: to get in the way, to prevent something from moving or getting
	through
	determine: to discover or confirm something, usually with research
Week 5	radiant: shining brightly

	direction: position in which a person or something moves or faces redirect: to change the direction of something reverse: to move into the opposite position or direction reflection: effect of light (or sound or heat) bouncing off an object
Week 6	warn: to signal a possible danger reflect: to throw back (heat, light, or sound) from an object transparent: allowing light to pass through so objects behind can be clearly seen opaque: not allowing light through, not able to be seen through translucent: allowing some light through dim: (adj) not shining brightly; (v) to become or make less bright
Week 7	engineer: someone who designs and builds engines, machines, or structures invent: to create or design something that did not exist before improve: to make better innovate: to make changes in something that already exists creativity: the use of imagination, such as to design inventions, produce art, and solve problems in new ways persevere: to keep trying in the face of difficulty
Week 8  (review of previous words)	senses: ways in which animals' bodies collect information about the world effect: a change that happens because of an action amplify: to increase the volume of sound, to make sound louder determine: to discover or confirm something, usually with research warn: to signal a possible danger innovate: to make changes in something that already exists

### **Change and Draw**

- 1. Look at the first word.
- 2. Change and write the word according to the directions.
- 3. Draw a picture of the new word.
- 4. Check your work with your partner.

### Make Multisyllable Words

- 1. Cut the words apart.
- 2. Make two piles, with and without stars.
- 3. Match a ★star syllable with a \_\_plain syllable to make a word.
- 4. Record each word you make on the recording sheet.
- 5. Check your work with your partner.

### **Make Compound Words**

- 1. Choose two words that go together to make a new, compound word.
- 2. Record the two short words and the compound word in the correct columns on the recording sheet.
- 3. Check your work with your partner.

### **Take Apart Compound Words**

- 1. Read the compound word.
- 2. Say the two smaller words that make the compound words.
- 3. Write them on the recording sheet.
- 4. Check your work with your partner.

Cut apart, and glue	Directions for Unit 4 Word Work Activities (New) e into a folder, place on a ring, or create another accessible format.
	Word Work Station: Activity Directions Cards

### **Big Ideas**

- Vibrating materials make sound. Sound makes materials vibrate.
- Materials interact with light in different ways.
- Light and sound travel.
- Humans and other animals communicate with light and sound.
- People innovate and invent to solve problems.

Art	Building	Drama	Library	Science & Engineering	Writing & Drawing	
Children pres	Children present					
Questions/Fo	cus					
Observationa	al Notes		14/1		at is going on here? about this moment?	
		What does			ow and care about?	

Observational Notes, continued	
Reflection	What similarities/trends do I notice? What surprises me? What do these observations seem to suggest? What else might be going on?
Next steps	What else do I want to observe or find out?  What resources will I need?