

# Lesson 14 – Measuring What We Can't See

## Overview

This lesson introduces the science concept of latent variables, which are variables that are not directly observed but are rather inferred from other variables that are observed. The lesson will not be using the term “latent variable,” instead the concept will be described as an “invisible” variable or variables that are not visible to the naked eye. Scientists use special tools to measure “invisible” variables, such as emotions. These tools allow scientists to measure the emotions people are experiencing in response to life events.

UQUEST scientists will first learn about the most common emotions and make typical facial expressions that express these emotions. Then, UQUEST scientists will create their own emotion meters using emoji cutouts. They will then use these emotion meters to show how they would feel in a series of hypothetical situations. After completing the lesson, UQUEST scientists will understand that scientists can create tools to help measure “invisible variables,” including emotions.

## **Science Objectives:**

UQUEST Scientists will:

- understand that scientists are sometimes interested in measuring variables that cannot be observed directly.
- understand that when scientists are interested in measuring something that's not visible with our eyes, scientists develop tools to help with the measurement.

## **Health Messages:**

- Everybody experiences emotions. It's normal.
- Labeling and identifying our emotions can help us learn about what situations bring up certain emotions.

## **Reinforcement of Previous Lessons:**

- Measurement (Lesson 5) - Sometimes we need tools for measurement, including rulers, tape, scales, watches, or other measurement tools that scientists create.
- Operational definitions (Lesson 10) - Sometimes we use clues, like a smile, to operationally define a person's emotion, like happiness.

## **Vocabulary:**

- **Emotions:** our inner feelings, such as happy, angry, scared, or sad.

## **Materials**

- UQUEST kit
- 1 pack of cardstock paper
- Clothes pin – for each UQUEST scientist

- 4-5 sets of colored pencils, crayons
- Glue sticks
- Scissors – for each UQUEST scientist
- Rice
- Balloons
- Water bottles
- Permanent markers
- Emoji sheet - for each UQUEST scientist

### Preparation:

#### At UM:

- Each UQUEST guide will make their own emotion meter to use as a model when instructing the UQUEST scientists.
- Print emoji sheets on cardstock paper for every UQUEST scientist in the class.
- Cut all emojis
- Fill water bottle halfway
- Print and laminate tally sheet

#### At OYC:

- Place art supplies (clothes pins, coloring utensils, tape, scissors) on a table in the front of the classroom.

### Introductory Script:

*Welcome UQUEST scientists.*

*Remember the lab notebook is an important tool that scientists use to record their observations and the results of their experiments.*

*Let's open up your lab notebooks to the second page. Like all scientists, UQUEST scientists pay attention to the world around them. They create an environment that helps them to learn about the world. They listen to each other. They communicate with each other. And they treat each other with respect.*

***Let's review the values of a UQUEST scientist. Each UQUEST scientist reads OUT LOUD one value.***

1. **Pay attention** when others are talking.
2. **Speak in a low voice.** Do not scream.
3. **Respect each other.** Do not push or shove each other.

**\*\*Be sure to praise the students when they do well.\*\***

## Relaxation

*Before we begin the lesson, we'd like to start off by doing a relaxation activity. When scientists are relaxed, they do better science.*

*For today's relaxation activity we will practice belly breathing.*

- Guide the UQUEST scientists, through some belly breathing for ~1 minute.

## Instructions for UQUEST Guides

### **1. Introduction (~5-10 mins)**

- In UQUEST, we've done a lot of quests that involve measuring things. When we measure something, we assign numbers to its characteristics.*
  - For example, if we wanted to compare how tall things are, we could measure their height. A tree might be 50 feet tall compared to a person who might be 6 feet tall.*
- What are some measurement tools we used during past quests?*
  - Example:** *We measured the weight of plantain chips and yogurt using a scale.*
- We can use our senses to observe and measure characteristics, like how many people are wearing blue shirts in the class. We can use our eyes to see the blue shirts.*
- BUT there are other characteristics or variables that are invisible, or that we can't measure just by observing with our eyes.*
  - Those variables are harder to measure using just our senses because we can't see them with our eyes. Those variables that we cannot observe with just our eyes require the use of tools for a more accurate measurement.*
- Example:** *Let's pretend that you and your friend are going to the youth fair.*
  - How can you check if your friend is tall enough to go on a ride?*
    - You can measure your friend's height by using a tape measure or by having your friend stand against the height board at the fair that says "you must be this tall to ride." Height is easy to measure.*
  - How can you measure how excited your friend is feeling?*
    - This can be tricky. It can be hard for us to measure things we can't see with our eyes, like things that are happening inside a person. Do you know of any tools, like a ruler, that can measure someone's excitement?*
- The variable we're focusing on today is called EMOTIONS.*
- What are emotions?*
  - Emotions are the feelings inside us, such as happy, angry, scared, or sad.*
  - For example, when we watch our favorite movie, we might feel happy. When we hear some bad news, we might feel sad.*
- What are some other emotions that you feel sometimes? When do you feel that way?*
  - Engage in discussion**
  - It is harder to know how someone else is feeling, but we might see a clue that can help us guess how that person feels.*

- i. *What clue might we see on someone's face when that person feels really happy? (What do people usually do when they feel really happy?)*
  - 1. *When someone feels happy, that person usually smiles. A smile is a clue that someone is happy. We cannot see happiness directly, but we can see a smile, which is a clue.*
- ii. *Emotions are hard to measure because we cannot see them directly. That is why we call them invisible!*

## 2. Intro Activity (~5 mins)

- a. *Scientists have studied the faces that people make that go along with certain emotions.*
- b. *Sometimes we use clues, like a smile, as our operational definition for a person's emotion, like happiness.*
  - i. *In other words, some people may define happiness by a smile. The feelings inside us are invisible because we can't see them with our eyes, but the faces people make give clues and can help us to detect emotions.*
- c. *What are visible clues of being surprised or scared?*
  - i. **Examples:** *surprised – mouth open, eyebrows raised, eyes open wide.*
  - ii. *Scared – mouth stretched and pulled back; eyebrows pulled together.*
- d. **Ask UQUEST scientists to show the face that they think match each emotion:**
  - i. *Pretend you're alone in the woods and you saw a bear right in front of you. How would you feel? What face would you make? (Fear, Scared)*
  - ii. *Pretend you just found out you got an A on your test. What face would you make? (Happiness)*
  - iii. *Pretend you spilled chocolate milk on your favorite shirt. What face would you make? (Sadness)*
  - iv. *Pretend you saw someone eating applesauce mixed with bacon, cheese, onions, and sour gummy worms. What face would you make? (Disgust)*
  - v. *Pretend your sibling won't let you play your favorite game. What face would you make? (Anger)*
  - vi. *Pretend your family surprised you with your favorite cake on your birthday. What face would you make? (Surprise)*
- e. *When you made the faces for the emotions, did you really feel – surprise, disgust, anger?*
  - i. *Even though you made a face that may have given someone a clue that you were feeling a certain emotion, you weren't really feeling that way.*
  - ii. *So, faces can be helpful in figuring out emotions, but the faces we make are not always matched with our actual emotions.*

## 3. Activity (~15-20 mins)

- a. **Hand out emotion meter sheet with emojis.**
  - i. *Many of us may use emojis to express emotions when we are using technology.*
- b. *Take a look at the "excited" emoji. What are clues that help you to know that this is an excited face?*
  - i. *The eyes are wide, the eyebrows are raised, and it has a big smile.*
- c. *Take a look at the "sad" emoji. What are clues that help you to know that this is a sad face?*

- i. Its mouth is frowning, its eyebrows are closed, and there's a tear running down its face.
- d. Even though we may have some clues, one way to more accurately know if a person is experiencing an emotion is by asking them.
- e. Today we're going to be creating our own tool to help us measure our "invisible" emotions. We will call this our emotion meter.
- f. **Show sample emotion meter and provide instructions.**
  - i. First, color the 6 emojis you will use for your meter.
  - ii. Next, cut them out and stick them in the right-hand column of squares on the emotion meter base (paper with 12 squares).
  - iii. Color the left-hand column of squares in a color that you feel represents each emotion.
  - iv. Lastly, cut out the "I feel" tag and attach the tag to a wooden clothes pin with a piece of double-sided tape.



- g. **Once emotion meter is complete:**
- h. I am going to read some imaginary situations. As I read each one, pretend they are happening to you. Then use your emotion meter to choose the emotion you might feel.
- i. **4 scenarios:**
  - i. **Situation 1:** Imagine you painted a really beautiful picture in art class and the teacher holds it up to show everyone. How would you feel?
  - ii. **Situation 2:** Imagine you're eating your favorite ice cream cone and you accidentally drop it and it gets all over your favorite shoes. How would you feel?

- iii. **Situation 3:** *Imagine you're playing your favorite sport and both teams are tied the entire game. In the last few seconds, the other team scores and wins the game. How would you feel?*
- iv. **Situation 4:** *Imagine It's time for recess! You're planning to play on the swings, but when you get to the playground, all the swings are being used. How would you feel?*

#### 4. Documentation (~5-10 mins)

- a. *Let's take the first situation: "you painted a really beautiful picture in art class and the teacher holds it up to show everyone. How do you feel?"*
- b. *Let's figure out what was the most common emotion that people on the team chose.*
- c. *I will go around the table and ask which emotion you think you would feel in this situation so that we can document it on this tally chart.*
  - i. *Use your emotion meter to show how you would feel if that happened.*
- d. **UQUEST guide will make a tally chart to record the UQUEST scientists' answers.**
- e. **Repeat for situation 2 - 4**
- f. **Instruct UQUEST scientists to copy data from the tally chart onto their own tally chart on page 14B of their lab notebook.**

| SAD                                                                                | ANGRY                                                                              | CALM                                                                               | HAPPY                                                                               | SILLY                                                                                | EXCITED                                                                              |
|------------------------------------------------------------------------------------|------------------------------------------------------------------------------------|------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------|
|  |  |  |  |  |  |
| I                                                                                  | III                                                                                | I                                                                                  |                                                                                     |                                                                                      |                                                                                      |

- g. *For scenario that are supposed to be making you happy, we're seeing happy scientists!*
  - i. *Scientists use tools, like mood meters, to make conclusions on what people are feeling inside.*
- h. **Health message:**
  - i. *Everybody experiences emotions. It's normal to feel emotions. When you are experiencing strong emotions, it may be helpful to talk to a parent or trusted adult.*
  - j. *When we label and identify an emotion, it can help us learn how we feel about specific situations. Keeping track of our emotions is also good for your health because it helps to recognize what things make you feel certain emotions.*
  - k. *Recognizing how situations make you feel may help you understand how you can do things differently in the future to make you feel better.*

#### 5. Activity 2 (~10 mins)

- a. *One way to help us feel more calm and relaxed is by reducing stress!*
- b. *Has anyone ever tried squeezing a stress ball?*

- c. *When you're feeling overwhelmed or stressed out (like before taking a test), simply squeezing a stress ball for a few minutes can help release all that tension. Doing this regularly can help keep your stress levels in check, which is important for keeping calm.*
- d. **Instructions for making a stress ball**
  - i. Place the balloon around the opening of the water bottle, and gently squeeze the water bottle to allow the rice to go in.
  - ii. After the rice is all in, the balloon should have a snug fit to the rice inside it. Just make sure there isn't any extra air in the balloon.
  - iii. Tie the balloon and wipe away any excess rice from the outside.
  - iv. All ready to squeeze away stress and have fun!
  - v. Optional: decorate stress balls with permanent markers

## 6. Discussion (~10 mins)

1. **Now let's discuss what we did today. I will ask some questions, and if you answer, you get a sticker. At the end, the stickers can be traded in for a special prize. Let's GO!**
  - a. Award sticker for every question answered.
  - b. **Note:** below are example questions. You can ask additional questions not listed.
2. **Look at our chart. What do you see? How many said "sad," "angry," "calm," "happy," "silly," and "excited?" Which one was chosen by the most people?**
  - a. *Using our emotion meters, we were able to collect data and find out that a majority of people would feel "angry" in this situation. And no one would feel "happy, silly, or excited" in this situation.*
3. **What did we learn today?**
  - a. *Today we learned that some things are hard to measure by just observing, so we may need tools to help us measure and understand these variables in other ways.*
4. **Which variable that is not able to be observed with our eyes did we talk about today?**
  - a. *Emotions. Emotions are our feelings.*
5. **What are some examples of emotions?**
  - a. **Examples:** *Happy, angry, scared, or sad, silly, excited, scared.*
  - b. *We can use clues, like faces, to help us detect emotions. Another example is hunger! It's hard to measure hunger, but there are clues you can use to help detect hunger.*
    - i. *What are some clues of hunger?*
6. **What are some clues that may help you figure out the emotion a person is feeling?**
  - a. **Example:** *Happy -- Smile, laugh.*
7. **What is a tool to measure invisible things, such as happiness? Hint: we created it today!**
  - a. *An emotion meter.*
  - b. *This is a way to measure our emotions that we can use in school, at OYC, or at home*
8. **Wrap-up**
  - a. *What did you learn today? Write that down on the lines on page 14C.*
  - b. *How much did you like today's lesson on scale from strongly agree to strongly disagree.*
  - c. **Award prize at the end based on number of stickers.**

## References

- KidsHealth. Retrieved  
<https://classroom.kidshealth.org/classroom/prekto2/personal/growing/feelings.pdf>
- Tea Time Monkeys. Editable Mood Meter Clip Card.  
<https://www.teatimemonkeys.com/editable-mood-meter-clip-card/>
- Natural Beach Living. <https://www.naturalbeachliving.com/make-stress-balls-kids-will-love/>
- One Little Project. <https://onelittleproject.com/how-to-make-a-stress-ball/>



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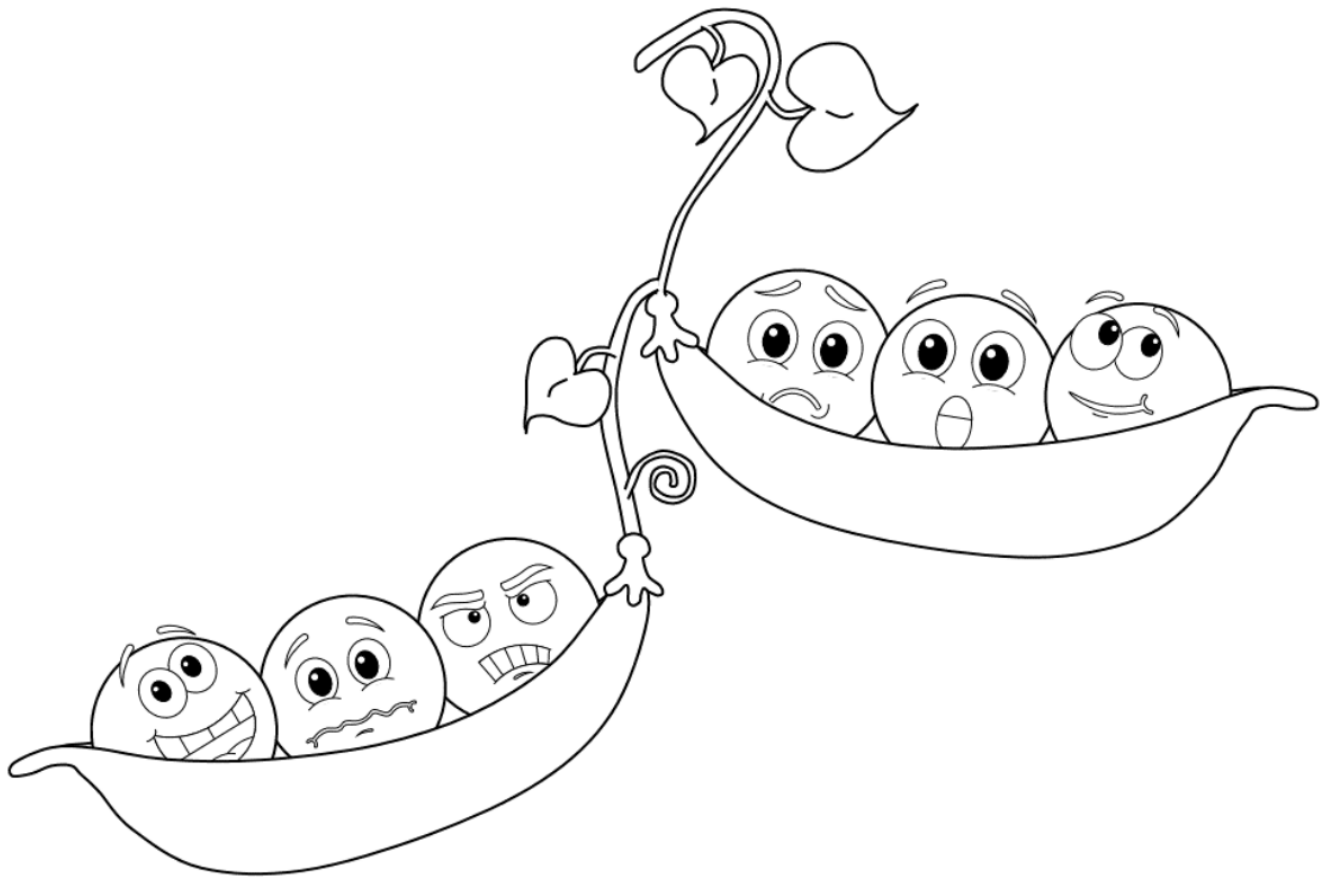






# Lesson 14

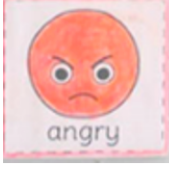
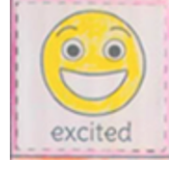
## Measuring What We Can't See



Date: \_\_\_\_\_

## Observing What We Can't See

Make a tally mark for each UQUEST scientist underneath the appropriate emotion.

|                    | SAD<br><br>sad | ANGRY<br><br>angry | CALM<br><br>calm | HAPPY<br><br>happy | SILLY<br><br>silly | EXCITED<br><br>excited |
|--------------------|-------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------|
| <b>Situation 1</b> |                                                                                                 |                                                                                                     |                                                                                                   |                                                                                                      |                                                                                                       |                                                                                                           |
| <b>Situation 2</b> |                                                                                                 |                                                                                                     |                                                                                                   |                                                                                                      |                                                                                                       |                                                                                                           |
| <b>Situation 3</b> |                                                                                                 |                                                                                                     |                                                                                                   |                                                                                                      |                                                                                                       |                                                                                                           |
| <b>Situation 4</b> |                                                                                                 |                                                                                                     |                                                                                                   |                                                                                                      |                                                                                                       |                                                                                                           |

Date: \_\_\_\_\_

# Lesson 14

What did I learn today?

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I liked this lesson (circle one):

**Strongly  
Agree**



**Agree**



**Disagree**



**Strongly  
Disagree**

