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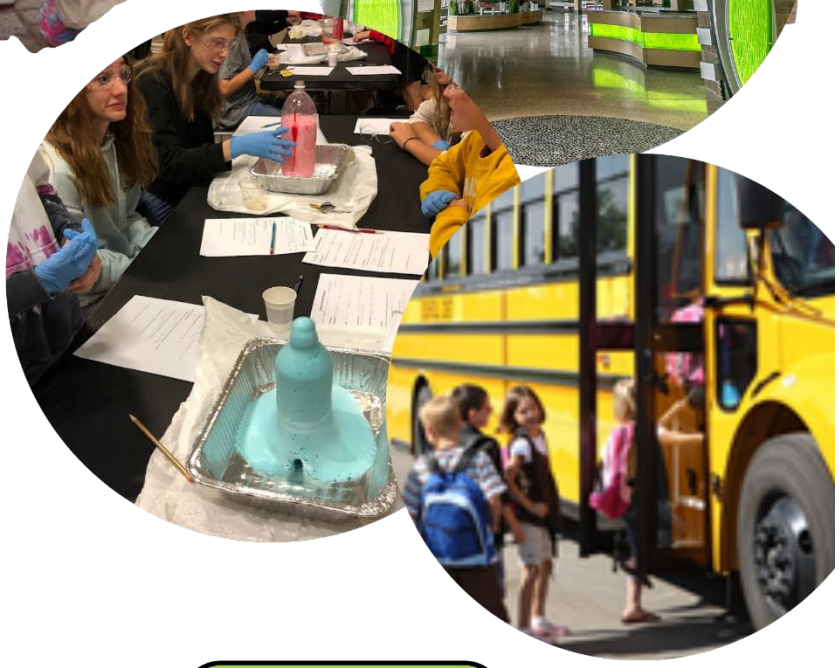

PreK-12

LESSON GUIDE FOR EDUCATORS

Interested in bringing your group or class on a field trip to the IQhub? Want your students to learn more about science, technology, engineering and math (STEM)? We have many available options that we can customize to fit your needs!

NEXT GENERATION SCIENCE STANDARDS

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Preschool

Planting Lesson - A spring lesson for preschoolers to learn about planting. Students will learn about what plants need to survive and will create "living necklaces".

Harvesting Lesson - A fall lesson for preschoolers to learn about harvesting. Students will complete a variety of hands-on activities to go along with their learning.

Agriculture in our Daily Lives Lesson - Students will learn about agriculture and how it plays a part in their daily lives. Hands-on activities will be used to teach students about different types of agriculture.

Kindergarten

Plant and Animal Needs Lesson - Students will learn about what plants and animals need to survive through hands-on activities. They will also discover how plants and animals may change their environment to fit their needs.
Standards**:** K-ESS2-2 Earth's Systems

Environmental Changes Lesson - Students will complete activities to demonstrate how plants and animals change the environment. They will look at shelter, animal tracks, and other things found in nature and that are human made that change the environment. Students will also learn about ways to protect the environment. This lesson will utilize our Augmented Reality Sandbox.
Standards: K-ESS2-2 Earth's Systems K-ESS3-1 Earth and Human Activity K-ESS3-3 Earth and Human Activity

Farm to Fork: Dairy Lesson* - Students will learn about the dairy industry, including the history of butter. Students will make butter and be able to taste test the butter they have made with crackers.
Standards: K-LS1-1 From Molecules to Organisms: Structures and Processes
Michigan benchmarks: K – G5.0.1 & K – E1.0.1

Agriculture in Michigan - Students will learn about agriculture in Michigan, including the history of agriculture. Students will learn about plants and animals in Michigan and how agriculture has affected Michigan's economy. They will also learn about the importance of soil. Students will have the opportunity to taste test Michigan products, depending on the time of the year. The taste test may include butter making, fruits and vegetables grown in Michigan, and fruit leather or preserves.
Standards: K-ESS2-2 Earth's Systems K-ESS3-1 Earth and Human Activity
Michigan benchmark: K – G5.0.1

Hands-On Activities for K-5

- Plant Needs Bracelets
- Living Necklaces
- Edible Vermicomposting
- Plant a Three Sisters Garden
- Seed Dissection
- Butter Making
- Cheese Tasting
- Apple Tasting (Fall)
- Apple Juice and Cider Tasting (Fall)
- Ice Cream Making
- Creature Creation
- Inherited Traits Flower Creation
- Water Filter Creation
- Michigan Product Taste Testing (depends on the time of year)
  - ✓ Fruits and Vegetables grown in Michigan
  - ✓ Butter
  - ✓ Preserves, jams, or fruit leather
- Jello Pollinators Simulation
- Augmented Reality Sandbox lesson

First Grade

Biomimicry Lesson -Students will complete various activities to learn and understand biomimicry and how it has been used to further develop technology. Students will learn about and complete activities designed to help them understand how patterns and behaviors of parents and offspring help them survive. Students will observe plant and animal behaviors and complete activities to show their understanding of how these things help the animal survive.
Standards: **1-LS1-1 From Molecules to Organisms: Structures and Processes**
1-LS1-2 From Molecules to Organisms: Structures and Processes

Inheritance and Variation of Traits Lesson* - Using dairy farms and apple orchards, students will learn about how young plants and animals are like, but not exactly like their parents. This lesson will include life cycles, observations, and hands on activities, like apple or cheese tasting, or butter making. **Can be requested as an "On the Road" lesson.*
Standard: **1-LS3-1 Heredity: Inheritance and Variation of Traits**

Sun, Seasons, and Farming Lesson* - Students will learn about how the amount of daylight changes throughout the year. They will complete activities and lessons to learn about how the position of the sun affects the seasons, and how this affects farming. **Can be requested as an "On the Road" lesson*
Standard: **1-ESS1-2 Earth's Place in the Universe**

Agriculture in Michigan - Students will learn about agriculture in Michigan, including the history of agriculture. Students will learn about plants and animals in Michigan and how agriculture has affected Michigan's economy. They will also learn about the importance of soil. Students will have the opportunity to taste test Michigan products, depending on the time of the year. The taste test may include butter making, fruits and vegetables grown in Michigan, and fruit leather or preserves.
Standard: **1-LS3-1 Heredity: Inheritance and Variation of Traits**.
Michigan benchmarks: 1 – G5.0.1 & 1 – G5.0

Second Grade

Pollination Lesson* - Students will learn about pollination and pollinators. They will learn about their importance and how they are essential for many of the fruits and vegetables that we eat. Students will complete pollination activities to demonstrate how this process occurs. *Can be requested as an "On the Road" lesson.
Standard: **2-LS2-2 Ecosystems: Interactions, Energy, and Dynamics**

Seed Dispersal Lesson - Students will learn about seed dispersal and the ways that this occurs in nature. They will learn about how a seeds design allows it to have the best chance of survival and becoming a new plant. Students will complete activities to simulate the way seeds are dispersed in nature by wind, water, and animals.
Standard: **2-LS2-2 Ecosystems: Interactions, Energy, and Dynamics**

Plant Needs Lesson (Spring & Summer Only) - Students will play games and complete hands-on activities, including planning and planting (depending on the time of year) a garden. This will help them learn about what plants need to survive and thrive. Most beneficial for Springtime field trips.
Standard: **2-LS2-1 Ecosystems: Interactions, Energy, and Dynamics**

Biodiversity in Agriculture* - Teachers can choose for students to learn about biodiversity in agriculture through plants, animals, pests, or all three. Students will complete lessons and hands-on activities designed to teach them about the

diversity of plants and animals (including pests) in an agricultural habitat, and their adaptations. Students will also look at conservation efforts and how biodiversity is good for agriculture. *Can be requested as an “On the Road” lesson
Standards: 2-LS4-1 Biological Evolution: Unity and Diversity

Agriculture in Michigan - Students will learn about agriculture in Michigan, including the history of agriculture. Students will learn about plants and animals in Michigan and how agriculture has affected Michigan’s economy. They will also learn about the importance of soil. Students will have the opportunity to taste-test Michigan products, depending on the time of the year. The taste test may include butter making, fruits and vegetables grown in Michigan, and fruit leather or preserves.
Standards: 2-LS4-1 Biological Evolution: Unity and Diversity
Michigan benchmarks : 2 – G4.0.1 & 2 – G5.0.1 & 2 – G5.0.2

Third Grade

Three Sisters Lesson* - Students will learn about two Native American legends about the Three Sisters. They will discuss the three life giving plants as well as the similarities and differences in the legends. Students will complete a squash investigation in the fall and plant the three sisters in the spring. Seeds may be requested during a fall lesson for classes to plant in the spring. *Can be requested as an “On the Road” lesson
Standards: 3-LS2-1 Ecosystems: Interactions, Energy, and Dynamics 3-LS4-3 Biological Evolution: Unity and Diversity
Michigan benchmarks: 3 – H3.0.4 & 3 – H3.0.5

History of Michigan’s Apples Lesson* (Fall only) - Students will learn about the history of Michigan’s apples. They will discover how the environment can influence traits and how the particular habitat is a factor in how well an organism survives. They will observe an apple tree life cycle and how an apple seed grows to produce more apples. They will complete activities with apples as the main material to reinforce ideas. Includes apple tasting or apple cider and apple juice tasting. *Can be requested as an “On the Road” lesson.
Standards: 3-LS4-3 Biological Evolution: Unity and Diversity 3-LS3-2 Heredity: Inheritance and Variation of Traits
Michigan benchmarks: 3-H3.0.1, 3-G4.0.1, 3-G4.0.3, 3-G5.0.1

Heredity Lesson* - Students will learn about inherited traits that are passed down from parent to offspring. They will gain a better understanding of how these traits help the offspring survive. They will complete activities to better help them understand inherited traits of plants and animals. *Can be requested as an “On the Road” lesson
Standards: 3-LS3-1 Heredity: Inheritance and Variation of Traits 3-LS3-2 Heredity: Inheritance and Variation of Traits

Life Cycles Lesson - Students will complete different hands-on activities, like candling eggs, to learn about life cycles of plants and animals
Standards: 3-LS1-1 From molecules to Organisms: Structures and Processes

Agriculture in Michigan - Students will learn about agriculture in Michigan, including the history of agriculture. Students will learn about plants and animals in Michigan and how agriculture has affected Michigan’s economy. They will also learn about the importance of soil. Students will have the opportunity to taste-test Michigan products, depending on the time of the year. The taste test may include butter making, fruits and vegetables grown in Michigan, and fruit leather or preserves.
Standards: 3-LS4-3 Biological Evolution: Unity and Diversity **Michigan benchmark: 3 – G4.0.1 & 3 – G4.0.3**

Wells and Groundwater - Water reaches the ground through some form of precipitation. However, the journey does not stop there. It continues moving in some form or another. Students will complete different activities to learn about wells and groundwater and how water moves on the earth. This activity will utilize the Augmented Reality Sandbox.
Standard: 3-ESS2-1 Earth's Systems

Fourth Grade

Soil and Roots Lesson - Students will learn about soil, roots, and erosion by looking at different plants. They will gain a better understanding of how plants have different structures that help them survive based on their location and needs. Students will learn how weathering and erosion effect the earth and crop. They will also learn about conservation efforts to prevent erosion. They will complete a root challenge to create a root system that can withstand erosion from water and wind. This lesson will utilize our Augmented Reality Sandbox.
Standards: 4-ESS2-1 Earth's Systems 4-ESS3-2 Earth and Human Activity

Processing Information and Senses Lesson* - Students will complete a variety of hands-on activities to learn about how information is received and processed through the different senses. They will learn about how the information that is received determines how an animal responds. *Can be requested as an "On the Road" lesson.
Standard: 4-LS1-2 From Molecules to Organisms: Structures and Processes

Corn: Fiber, Food, Fuel Lesson* - Students will learn about corn and how it is being used for different things. Corn is not just used for food and fiber, but also for fuel. Students complete activities that will help them learn about the "corn belt" and "bioplastics". *Can be requested as an "On the Road" lesson. Not all activities listed are available for this option.
Possible Activities: Making Bioplastics. Cornmeal Painting. Cornhusk Dolls. Corn Products Tasting.
Standard: 4-ESS3-1 Earth and Human Activity

History of Butter* - Students will learn about the dairy industry and the history of butter. They will also explore how food moves from a farm to their table. Students will learn about how animals have internal and external structure that function and support survival, growth, behavior, and reproduction. Students will make butter and be able to taste test their butter with crackers. They will then participate in a discussion about their senses. (Dairy warning) *Can be requested as an "On the Road" lesson
Standards: 4-LS1-1 From Molecules to Organisms: Structures and Processes 4-LS1-2 From Molecules to Organisms: Structures and Processes
Michigan benchmarks: 4 – H3.0.1 & 4 – H3.0.5

Wells and Groundwater - Water reaches the ground through some form of precipitation. However, the journey does not stop there. It continues moving in some form or another. Students will complete different activities to learn about wells and groundwater and how water moves on the earth. This activity will utilize the Augmented Reality Sandbox.
Standards: 4-ESS2-1 Earth's Systems 4-ESS2-2 Earth's Systems

***The IQhub is bringing agriculture directly to YOU!**

We are thrilled to introduce our new "On The Road" lessons, enabling IQhub educators to deliver agriculture lessons right in your classroom. Teachers who participated in the fall can enjoy a complimentary follow-up lesson that enhances your students' grasp of the concepts they discovered during their field trip. If you haven't had the opportunity to visit yet, don't worry! Your students can still experience the wonders of the IQhub through a captivating agricultural lesson customized for your classroom.

Reach out to us today to arrange your "On The Road" lesson and make agriculture come alive for your students!

Fifth Grade

How Plant Meet Their Needs Lesson - Students will learn about plant needs and how these needs are met by air and water. To complement this lesson, they will look at painting with natural materials. Students will discuss how plants get the things they need from the air, water, sunlight, and soil, and will create and use paint from different plants.
Standards: **5-LS1-1 From Molecules to Organisms: Structures and Processes** **5-PS3-1 Energy**

Water Filtration Lesson - Students will learn about how much "usable" water is on earth. In this activity students will not only be able to visualize how much water is on the planet, and how much they can use. They will also discuss water conservation and how different places get clean water. Students will also learn about watersheds. Students will complete a water filtration activity and learn about conservation efforts. This lesson will utilize our Augmented Reality Sandbox.
Standards: **5-ESS3-1 Earth and Human Activity** **5-ESS2-1 Earth's Systems** **5-ESS2-2 Earth's Systems**

Food Webs and Vermicomposting Lesson* - Students will learn about food webs and how energy from food moves through an ecosystem. Students will learn about decomposers and vermicomposting, and how it can help the environment. Students will learn how to start a vermicompost bin and complete an edible "vermicomposting" by making dirt cups. Students will also learn about healthy soil, and how vermicomposting contributes to soil health and conservation. Teachers can request that their class create a "compost in a bottle" to take back to class. *Can be requested as an "On the Road" lesson
Standard: **5-LS2-1 Ecosystems: Interactions, Energy, and Dynamics**

Matter and Interactions Lesson—Students will learn how mixing substances results in a new substance and how the weight of the matter is conserved when substances are mixed, heated, or cooled. Hands-on activities that may be chosen for this lesson include butter making, ice cream making, Matter Mystery, and an Egg Experiment.
Standards: **5-PS1-4. Matter and Its Interactions** **5-PS1-2 Matter and Its Interactions**

Conservation: Reduce, Reuse, Recycle* - Students will learn about renewable and nonrenewable resources and how to conserve these resources. Students will learn about the importance of reducing, reusing, and recycling. Students will learn how agriculture impacts the environment and how people can work to positively impact the environment. Students will complete hands-on activities to explore this topic and to develop skills to use in their daily lives to have a positive impact on the environment. *Can be requested as an "On the Road" lesson
Standards: **5-ESS3-1 Earth and Human Activity**

Wells, Groundwater, and Watersheds - Water reaches the ground through some form of precipitation. However, the journey does not stop there. The water continues moving in some form or another. Students will complete different activities to learn about wells and groundwater and how water moves on the earth through watersheds. This activity will utilize the augmented reality sandbox.
Standards **5-ESS2-1 Earth's Systems** **5-ESS2-2 Earth's Systems**

Middle School

Cool Chemistry (2 options) - *AgroLiquid Chemistry Description:* Students will understand the importance of product compatibility for the environment and farmers. Students will explore how chemical reactions can cause issues for soil and farming equipment and understand the value of protected and unprotected nutrients. Students will complete an experiment to test for compatibility.
Standard: **MS-PS1-2 Matter and its Interactions**

Chemical Reactions Description: Students will learn about reactions and catalysts. They will learn about reactions that occur in nature, like photosynthesis, and that occur in a chemistry lab by making elephant toothpaste. Students will discover that different products can be given off from a reaction.
Standards**: MS-PS1-2 Matter and its Interactions MS-PS1-5 Matter and its Interactions MS-PS1-6 Matter and its Interactions**

Photosynthesis - Students take a closer look at photosynthesis by completing an experiment designed to see part of the process of photosynthesis and how plants convert sunlight and carbon dioxide into oxygen.
Standard: **MS-LS1-6 From Molecules to Organisms: Structures and Processes**.

Aquatic Biodiversity and Macroinvertebrates - Students will learn about aquatic biodiversity as well as how the macroinvertebrates present in a body of water can indicate the health of the ecosystem. In this lesson students will examine water samples and try to identify the macroinvertebrates in the water. They will assess the health of the body of water.
Standards: **MS-LS1-1 From Molecules to Organisms: Structures and Processes MS-LS1-4 From Molecules to Organisms: Structures and Processes**

Careers in Agriculture - Students will learn about career opportunities in the Agriculture Industry. Students will learn about how to reach their goals to get a job working in the Agriculture Industry and will learn specifics about AgroLiquid. This can include a building tour of AgroLiquid Headquarters with an explanation of how AgroLiquid is a LEED building.

Birds and Bees of Plants - Students will learn about pollination, plant reproduction, inherited traits, and adaptations. Students will complete a flower dissection and explore how genetics can cause variations in a species.
Standards: **MS-LS1-4 From Molecules to Organisms: Structures and Processes MS-LS4-4 Biological Evolution: Unity and Diversity MS-LS4-5 Biological Evolution: Unity and Diversity MS-LS4-6 Biological Evolution: Unity and Diversity**

Forestry - Students will learn about a forest ecosystem, including biotic and abiotic factors within an ecosystem. They will identify the age of trees and understand different types of trees and how they grow. Students will also explore the forest industry and its importance in Michigan's economic development. This lesson will utilize our Augmented Reality Sandbox.
Standards: **MS-LS2-1 Ecosystems: Interactions, Energy, and Dynamics MS-ESS3-3 Earth and Human Activity MS-ESS3-4 Earth and Human**

Plant Picasso - Students will learn about soils health as well as Macro vs. Micronutrients. Students will explore the connection between healthy soil and healthy plants and how this affects the look of plants. Students will then paint with plant pigments to create their own artwork.
Standards: **MS-LS2-1 Ecosystems: Interactions, Energy, and Dynamics MS-LS2-3 Ecosystems: Interactions, Energy, and Dynamics**

Wonderful World of Water - Students will explore the water cycle and the types of water on Earth. Students will explore how the world is connected to water. They will complete a soil and water filtration challenge. Students will also learn the importance of protecting our water sources and ways to conserve water. This lesson will utilize our Augmented Reality Sandbox.
Standards: **MS-ESS2-4 Earth's Systems** **MS-ESS2-6 Earth's Systems** **MS-ESS3-1 Earth and Human Activity** **MS-ESS3-3 Earth and Human Activity**

High School

Careers in Agriculture - Students will learn about careers in agriculture and careers at AgroLiquid. Students will learn about opportunities in the agriculture industry and have an opportunity to hear from panelists who work at AgroLiquid (if requested).

AgroLiquid and Chemistry - Students will learn about compatibility and its importance to farmers and the environment. Students will learn how chemical reactions can cause issues for soil and farm equipment. Students will also understand protected and unprotected nutrients, and Le Chatelier's Principle.
Standards: **HS-PS1-2 Matter and its Interactions** **HS-PS1-6 Matter and its Interactions**

Soil CSI - Students will learn about soil and how soil chemistry can be used to solve crimes. They will look at biotic and abiotic factors to discover how these are used to investigate and solve crimes. Students will learn about how soil is a valuable resource that must be protected and how humans impact the environment in positive and negative ways. They will also explore the vermicomposting industry. This lesson will utilize our Augmented Reality Sandbox.
Standards: **HS-ESS3-4 Earth and Human Activity** **HS-LS2-7 Ecosystems: Interactions, Energy, and Dynamics**

Intro to Genetics - In this lesson, students will learn about DNA and chromosomes. They will learn how Karyotype works. Students will complete an activity to learn how Meiosis affects DNA being passed down from parent to offspring and will use this knowledge to create a pigeon to analyze. Students will also extract DNA from strawberries. This lesson may also include lessons on genetics through Punnett Squares.
Standards: **HS-LS1-1 From Molecules to Organisms: Structures and Processes** **HS-LS3-1 Heredity: Inheritance and Variation of Traits** **HS-LS3-3 Heredity: Inheritance and Variation of Traits** **HS-LS4-4 Biological Evolution: Unity and Diversity**

Protein Please - Students will learn about milk and cheese and the nutrition they provide. They will have the opportunity to make cheese to learn about acidity, pH, chemical reactions, and how enzymes act as biological catalysts in the dairy industry. After students make cheese, they will have an opportunity to taste test the cheese they made and compare it to cheese purchased from a store. Students will learn about amino acids and proteins in their food and the future of the food science industry.
Standards: **HS-LS1-1 From Molecules to Organisms: Structures and Processes** **HS-PS1-2 Matter and its Interactions** **HS-PS1-5 Matter and its Interactions**

Field Trip Expectations

Teacher Expectations

- Please remind students before their visit of museum expectations. This is a fun field trip with a lot of learning opportunities. Students should walk in the museum and use inside voices. Some displays are interactive, and there are some games for students to play in the museum. However, other than interactive and game buttons, students should not touch the displays. Students following these expectations will help ensure everyone is safe and displays do not get broken.
- Please divide students into groups of 5 to 6, before your visit, with a chaperone in charge of each group of students. If you have more chaperones and need to make smaller groups, please ensure that all chaperones know which students they are in charge of in their group during their visit. It is recommended that teachers not lead a group, in case of emergencies and so they are able to float around and monitor student behaviours, but it is not required.
    - Chaperones are responsible for the behaviour of students in their group, while visiting the museum.
- Please share the Chaperone Expectation Sheet with chaperones before the visit.
- Ensure that students are aware of the IQhub's expectations for their behaviour.
- For safety, please ensure that students are accompanied by and adult when they need to use the restroom once groups are in the classroom. Adults should ensure that students go to the bathroom and return to the classroom without making detours in the museum.

Student Expectations

- Remember that you represent your school and community. You and your group may be asked to leave if you do not follow these expectations.
- While you are here, treat the IQhub as your classroom.
- Do not yell or run.
- Make sure you always stay with your chaperone. Do not run ahead or roam around without your chaperone.
- Do NOT touch displays, unless signs or staff tell you it is okay. Some displays are interactive. A sign will let you know when this is the case.
- Be respectful of other visitors and staff.
- Do not cross barriers or climb the artifacts/exhibits. Ropes, fences, and barriers are there to keep you safe, and protect our artifacts/exhibits.
- No food or beverages are allowed in the museum. If your group is having lunch at the IQhub keep food and beverages in the classroom.

Chaperone Expectations

- For the safety of your students and the consideration of our other guests, we ask that you be responsible for the behaviour of students who are in your group. Lack of supervision and/or inappropriate behaviour may result in our staff requesting that all field trip attendees leave the IQhub.
- To experience our exhibits properly it is recommended that no more than 5 or 6 students be at an exhibit at one time. Depending on group sizes, this may mean only one group at each exhibit. Combined to make larger groups will take away from the experience because not every student will be able to view the information being presented. Encourage students to explore as a group and decide what they want to see.

- We ask that you keep students in a group, because students running ahead or roaming without you could get lost. Please make sure that you always supervise your group regardless of their age.
- Your job is not to be an expert but to help students learn for themselves. Encourage students to read displays or read the displays to them. Help them to find the answer to scavenger hunts without giving them the answer. An IQhub Scavenger Hunt Notes page may be provided depending on the scavenger hunt your group is completing. You do not have to complete the scavenger hunt in order.
- In the IQhub classroom, please sit near your group and help assist students during the lesson by encouraging them and asking guided questions. Please do not give them answers but help them to explore and learn with their group members. Remember, the person who does the work does the learning.
- When taking students to the restroom from the IQhub classroom, please make sure that students go to the restroom and come right back to the classroom. This will ensure they do not disrupt other groups in the museum and will not miss any instruction in the classroom.

For more information on lesson content contact IQhub Lead Educator Morgan Terrell at morgan.terrell@agroliquid.com or by phone: 989-402-5995

IQhub
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