Science Unit

ISTC 541.800

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Introduction

For this assignment, a Kindergarten Science Unit was planned and utilized for future instructional use. This unit has been created by the educator for this assignment, and furthermore adapted, to guide future instruction, to best meet student needs in the primary-based classroom setting. The unit is to be implemented within the science-block of the instructional day and is to be taught throughout five days.

The school in which the unit is to be implemented is a public school located within Anne Arundel County. The school serves students within grades pre-kindergarten through fifth grade and is comprised of approximately 485 students. The school's minority student enrollment is 80%. Additionally, the student population is made up of 49% female students and 51% male students. The school enrolls approximately 77% economically disadvantaged students each year. The kindergarten class specifically in which the unit will be implemented closely reflects these school-based demographics.

Technology Product

Section 1: Collecting and Displaying Unit Plan

Lessons	Objectives	Standards	Assessments	Technology Used
1	Students will be able to identify objects that sink.	**Common Core Standards:** Standard 1.0 Skills and Processes (K.A.1): Students will demonstrate the thinking and acting inherent in the practice of science. Topic B. Applying Evidence and Reasoning Indicator: People are more likely to believe your ideas if you can give good reasons for them. Objectives 1. Provide reasons for accepting or rejecting ideas examined. 2. Develop reasonable explanations for observations made, investigations completed, and information gained by sharing ideas and listening to others' ideas. 3. Explain why it is important to make some fresh observations when people give different descriptions of the same thing. Topic C. Communicating Scientific Information Indicator: Ask, "How do you know?" in appropriate situations and attempt reasonable answers when others ask them the same question. Objectives: 1. Describe things as accurately as possible and compare observations with those of others. 2. Describe and compare things in terms of number, shape, texture, size, weight, color, and motion. 3. Have opportunities to work with a team, share findings with others, and recognize that all team members should reach their own conclusions about what the findings mean. 4. Recognize that everybody can do science and invent things and ideas.	• Observations • Anecdotal notes • Exit Ticket	• Google Slides • Canva • Wheel of Names • Brainpop Jr. Video: Sink or Float: https://jr.brainpop.com/science/forces/sinkorfloat/ • Poll Everywhere • Nearpod
2	Students will be able to identify objects that float.	**K.A.1b-c**	• Observations • Anecdotal notes • Exit Ticket	• Google Slides • Canva • Kami • Eggspert
3	Students will make predictions and test objects to determine if objects will sink or float.	**K.A.1b-c**	• Observations • Anecdotal notes	• Google Slides • Canva • Wheel of Names • Voki • Kami • Flipgrid
4	Students will sort objects by their ability to sink and float.	**K.A.1b-c**	• Observations • Anecdotal notes • Exit Ticket	• Google Slides • Canva • Kami

5	Students will build a boat out of tin foil to display what makes an object sink or float.	**K.A.1b-c**	- Observations - Anecdotal notes - Summative Assignment- Tin-foil boat	- Sesame Street Video: Murray Experiment: Boats: https://www.sesamestreet.org/toolkits/stem/sink-or-float - Flipgrid - Wheel of Names - Voki - Show Me

Part 1.b.: Detailed Unit Lesson Plans

Lesson 1

Teacher: General Educator, Kindergarten Teacher
Date: Day 1 of the Unit
Subject/Grade level: Science/Kindergarten
Materials: Google Slides, vocabulary cards made via Canva: sink, link to Wheel of Names, link to Poll everywhere via Nearpod
Technologies Implemented: In this lesson, the teacher will guide instruction through the use of Google Slides to display various learning materials. Additionally, Canva will be utilized to display important vocabulary and anchor charts created prior to the lesson to enhance student understanding of material. Wheel of Names will be utilized to encourage student participation and act as a means of partnering students to elicit collaboration and discission. Poll everywhere, Kami, and Flipgrid will act as a means of assessment at the end of the lesson as students are provided a choice in demonstrating their understanding of their learning through the use of these tools.
Lesson objective(s): Students will be able to identify objects that sink by naming two factors that cause and item to sink.
Standard(s) Addressed **ISTE-NTS-S** Creative Communicator: Students communicate clearly and express themselves creatively for a variety of purposes using the platforms, tools, styles, formats, and digital media appropriate to their goals. **6b.** Students create original works or responsibly repurpose or remix digital resources into new creations. **6d.** Students publish or present content that customizes the message and medium for their intended audiences.

Common Core Standards:
Standard 1.0 Skills and Processes (K.A.1): Students will demonstrate the thinking and acting inherent in the practice of science.
Topic B. Applying Evidence and Reasoning
Indicator: People are more likely to believe your ideas if you can give good reasons for them.
Objectives
1. Provide reasons for accepting or rejecting ideas examined.
2. Develop reasonable explanations for observations made, investigations completed, and information gained by sharing ideas and listening to others' ideas.
3. Explain why it is important to make some fresh observations when people give different descriptions of the same thing.
Topic C. Communicating Scientific Information
Indicator: Ask, "How do you know?" in appropriate situations and attempt reasonable answers when others ask them the same question.
Objectives:
1. Describe things as accurately as possible and compare observations with those of others.
2. Describe and compare things in terms of number, shape, texture, size, weight, color, and motion.
3. Have opportunities to work with a team, share findings with others, and recognize that all team members should reach their own conclusions about what the findings mean.
4. Recognize that everybody can do science and invent things and ideas.

NAEYC Standards
2.G.07
a. Children are provided varied opportunities and materials that encourage them to discuss scientific concepts in everyday conversation
2.G.08
a. Children are provided varied opportunities and materials that help them learn and use scientific terminology and vocabulary associated with the content areas
2.H.02
All children have opportunities to access technology (e.g., tape recorders, microscopes, computers) that they can used by themselves.
b. collaboratively with their peers.
c. with teaching staff or a parent.
2.H.03
Technology is used to
a. extend learning within the classroom.
b. integrate and enrich the curriculum.

Differentiation strategies to meet diverse learner needs:

Students have multiple ways to express their understanding throughout the lesson such as using text through Kami or video through Flipgrid. There are multiple means of engagement such as polling, collaborative discussion, and partner talk.

ENGAGEMENT (5-10 minutes)
Through the use of **Google Slides**, tell students about the general idea of their challenge:

- Teacher will show the picture of the boy on the island with his bear. Teacher will go to the next slide after the morning message, a picture of the little boy on the island will pop up.
- Say, "Oh no, look! A little boy and his teddy bear are stranded on an island because their boat sank. They need our help!!
- At the end of this unit, we will build a boat that will float and take the boy and his bear back home to his family. BUT before we can make the boy a boat that floats, we need to learn about what makes some objects float in the water and

other objects sink (link to prior learning.) What do you think makes some things sink and some things float?" Give students a few seconds to think.
- Say, "Can anyone tell me why some objects float and why some objects sink? Please raise your hand if you'd like to share."
- Write down students' ideas on prediction chart. Take three predictions for float and three predictions for sink.
- Teacher will say, "I think we made a great list. I bet our friends Moby and Annie will be able to tell us some more. Let's watch a video about sinking and floating." Show video from Brainpop Jr: Sink or Float. Teacher will tap icon at bottom of page to open the video.

EXPLORATION (15 minutes)

After the video has been shown say,

- "Wow, Moby and Annie told us a lot about why objects sink and why objects float. Let's go over some important things they said so we can make sure we make sturdy boats for the boy so he can return to his family. I'm sure they miss him."
- Teacher will go to next slide in presentation with a list of objectives for the unit. Tell the students what they will be doing throughout this unit (objectives). Refer to presentation through smartboard/interactive whiteboard (**Google Slides**).
- Teacher will point to the board as she/he discusses each objective. Say, "For this unit, we are going to be using our observing, predicting, testing, comparing, classifying, and communicating skills to: Name two or more factors that contribute to whether or not an object sinks or floats. Identify and sort whether or not an object will sink or float. Predict which items will sink and which items will float and experiment to accept or reject our predictions."
- Today, "We will describe the term sink, by identifying two factors that cause an object to sink."

EXPLANATION (20 minutes)

- Say, "Now that we know what we are going to do today, let's get to learning about why objects sink."
- Using the definitions that were introduced in the video, the teacher will hold up the premade chart made through **Canva** with the word "sink," the definition of the word sink from the video (When something sinks, it falls to the bottom because it can't stay up on its own), and a picture of a boat under water because it sank. Explain, "We learned in Moby's video that when an object sinks, it means that it fell to the bottom.
- Do you see how this boat is under water and on the bottom of the sea floor?" Direct the students to place their hands flat on the ground to model that things that sink, fall to the bottom.
- Say, "Now let's show with our hands how things sink to the bottom. Place your hands flat on the ground."

ELABORATION (10 minutes)

- "Okay so now we know the definition of sink, let's look at things in the video we just watched, besides boats, that sank." Examples are seaweed, treasure chest, glass bottle, and gold coins. Teacher will show large flashcards with pictures of each item and the associated word i.e., seaweed, one at a time. Teacher will say, "When I show you an item that you saw in Moby's video, show me with your sink and float motions what the item does when it is in the water." Teacher will make observations during this activity to determine students' understanding based upon the motions they make when shown designated picture.
- Teacher asks the question, "What made Annie's boat float and Moby's first boat that he made sink?"
- Teacher will spin the **Wheel of Names** to determine partners.
- Have students turn and talk to their partner and share their thoughts.
- Teacher will say, "Turn and talk to your partner about what made Annie's boat float and Moby's first boat sink."
- After students have had the chance to turn and talk to their partners, call on a few groups of students to share why they think Annie's boat floated and why Moby's first boat sank. Say, "Can I have someone share why they think Annie's boat floated and Moby's first boat sank?"
- As the pairs are sharing, the teacher will point out which of the four contributing factors the children are sharing through premade charts made through Canva. As a pair shares a contributing factor, the teacher will hold up the

poster and/or display the poster via the **slide deck** with that contributing factor, i.e., weight, size, shape, or air inside. For example, if a pair said Moby's boat was too heavy and made it sink, the teacher can hold up the chart titled, "Weight" and say, "Yes, the weight of Moby's boat was more than the water, so Moby's boat sank." Repeat for the rest of the factors as they are mentioned (size, shape, air inside).

- The teacher will continue getting pairs' responses until all four factors have been identified and reviewed through each chart.

EVALUATION

- Send students back to their seats. Say, "You guys have learned so much. Now we know what happens when an object sinks and FOUR things that cause an object sink.
- Tell students that they will now have an opportunity to show what they know. Display the assignment that asks students to watch the button sinking in the water. Students must identify why the item sank by providing at least two factors that were discussed throughout the lesson (weight, size, shape, and/or air inside).
- Students have the option to respond to the prompt in Poll Everywhere accessible through the LMS (learning management system) Nearpod, orally through Flipgrid, or via text through Kami.

UDL CONNECTIONS:

Multiple Means of Representation:
Guideline 1: Provide options for perception
-Checkpoint 1.2 Offer alternatives for auditory information.
This guideline is satisfied throughout the entire lesson.

- The introductory video from BrainPOP Jr. that is shown to the students to introduce the words, "sink" and "float" includes captions, as well as an auditory component. This allows students to hear what the characters are saying and refer to the words at the bottom of the video, if needed.
- To display definitions of key vocabulary that are given in the video orally, the teacher uses charts with the vocabulary word in a different color, a definition or explanation of the vocabulary, and a picture.

- Checkpoint 1.3 Offer alternatives for visual information.
- Again, the BrainPOP Jr. video uses captions so that the students can read what the characters are saying in the video if they cannot hear it.

Multiple Means of Engagement:
Guideline 7: Provide options for recruiting interest
- Checkpoint 7.1 optimize individual choice and autonomy
- For the exit ticket, the teacher will give directions to the students orally, as well as supply a worksheet that reiterates the oral directions given. The exit ticket reflects UDL principles as the teacher gives his/her students as to how they want to display their knowledge (verbally, pictorially, or written.)

- Checkpoint 7.3 Minimize threats and distractions
- Students are constantly kept engaged in the lesson and classroom is set up to minimize distractions. Teacher gives clear instruction and observes closely to make sure students are on task.

Guideline 8: Provide options for sustaining effort and persistence
- Checkpoint 8.2 Vary demands and resources to optimize challenge
- Students begin with making predictions as to why objects sink or float. After watching a video and going through key vocabulary, students will participate in a smartboard sorting game and eggspert activity with their peers. Students will test their knowledge of sink or float by making a boat that sinks and a boat that floats with their group members. Students then complete an exit ticket individually and without teacher support to display their understanding of the material.

Multiple Means of Action and Expression:
Guideline 4: Provide options for physical action
- Checkpoint 4.1 Vary the methods for response and navigation
- Students show with their bodies whether or not they think an object sinks or floats through sink/float motions.

Lesson 3

Teacher: General Educator, Kindergarten Teacher
Date: Day 3 of the Unit
Subject/Grade level: Science/Kindergarten
Materials: Google Slides, vocabulary cards made via Canva: sink, float, weight, size, shape, air inside, student devices
Technologies Implemented: In this lesson, the teacher will guide instruction through the use of Google Slides to display various learning materials. Additionally, Canva will be utilized to display important vocabulary and anchor charts created prior to the lesson to enhance student understanding of material. Wheel of Names will be utilized to encourage student participation and act as a means of partnering students to elicit collaboration and discission. Voki, Flipgrid, and Kami will be used for students to record responses when conducting their experiment in a small group setting.
Lesson objective(s): Students will be able to make predictions and test objects to determine if objects will sink or float.
Standard(s) Addressed **ISTE-NTS-S** Creative Communicator: Students communicate clearly and express themselves creatively for a variety of purposes using the platforms, tools, styles, formats, and digital media appropriate to their goals. **6b.** Students create original works or responsibly repurpose or remix digital resources into new creations. **6d.** Students publish or present content that customizes the message and medium for their intended audiences. **Common Core Standards:** **Standard 1.0 Skills and Processes (K.A.1): Students will demonstrate the thinking and acting inherent in the practice of science.** Topic B. Applying Evidence and Reasoning Indicator: People are more likely to believe your ideas if you can give good reasons for them. Objectives 1. Provide reasons for accepting or rejecting ideas examined. 2. Develop reasonable explanations for observations made, investigations completed, and information gained by sharing ideas and listening to others' ideas. 3. Explain why it is important to make some fresh observations when people give different descriptions of the same thing. Topic C. Communicating Scientific Information Indicator: Ask, "How do you know?" in appropriate situations and attempt reasonable answers when others ask them the same question. Objectives: 1. Describe things as accurately as possible and compare observations with those of others. 2. Describe and compare things in terms of number, shape, texture, size, weight, color, and motion. 3. Have opportunities to work with a team, share findings with others, and recognize that all team members should reach their own conclusions about what the findings mean. 4. Recognize that everybody can do science and invent things and ideas. **NAEYC Standards** **2.G.07** a. Children are provided varied opportunities and materials that encourage them to discuss scientific concepts in everyday

conversation
2.G.08
a. Children are provided varied opportunities and materials that help them learn and use scientific terminology and vocabulary associated with the content areas
2.H.02
All children have opportunities to access technology (e.g., tape recorders, microscopes, computers) that they can used by themselves.
b. collaboratively with their peers.
c. with teaching staff or a parent.
2.H.03
Technology is used to
a. extend learning within the classroom.
b. integrate and enrich the curriculum.

Differentiation strategies to meet diverse learner needs:

There are multiple means of engagement such as polling, collaborative discussion, and partner talk, as well as an interactive Eggspert game that utilizes technology to engage learners in answering questions.

ENGAGEMENT (5-10 minutes)
Through the use of **Google Slides**, tell students about the general idea of their challenge:

- Teacher will remind students of culminating event/summative assessment: To build the boy a boat that floats.
- Standing at the front of the class, tell students (still in seats), "I have a bag that has lots of candy inside sitting here. Some of it sinks and some of it floats. Can you help me decide if this candy in my bag will sink or float?" Wait for class response.
- Teacher will set up the **Eggspert device/game** and place the bowl of water on the floor in front of the eggspert game so each student can see the experiment. Teacher will then display the recording chart via **Google Slides** in order for all students to see.
- Teacher will divide students into groups of 6, using the **Wheel of Names** application, designated by a color from the eggspert device: pink, orange, yellow, green, blue, purple.
- Teacher will say, "When I say go, tiptoe to your colored buzzer and sit in a row behind your buzzer. All my ones line up behind the pink buzzer, "Go." All my twos line up behind the orange buzzer, "Go." All my threes line up behind the yellow buzzer, "Go." All my fours line up behind the green buzzer, "Go." All my fives line up behind the blue buzzer, "Go." All my sixes line up behind the purple buzzer, "Go."

EXPLORATION (15 minutes)

- After students are all sitting behind their designated buzzer and in a row, explain to the students that they are going to be making predictions and justifying their predictions using the four factors that cause an object to sink or float to tell whether or not a piece of candy sinks or floats.
- Teacher will say, "We're going to be making predictions about whether a piece of candy sinks or floats. Your job will be to tell the class whether you think the candy I show you will sink or float and name or describe at least one factor that we talked about that helped you make your prediction. The person that buzzes in the quickest and is able to share their prediction and reasoning, will be able to put their prediction on our recording chart, "What Candy Sinks or Floats?"
- After you make your prediction, I am going to unwrap the candy and place it nicely in the water and we are going to observe to see if it sinks or floats. If your prediction was correct after we do our experiment with that piece of candy, your team will receive a point. The team with the most points win.
- Conduct procedure with each candy piece, documenting via Google slides whether or not the candy sank or floated.

EXPLANATION (20 minutes)

- After conducting the experiment, refer to recording chart and discuss observations. Based on student discussion, remind students of the terms sink and float, and the factors which cause an object to sink or float (weight, size, shape, and air inside.)
- Go through each candy experimented with and determine which factors impacted the outcome of the object's ability to sink or float.

ELABORATION (10 minutes)

- Students will then conduct a similar experiment with different objects in order to test whether they will sink or float.
- Students will be placed into small groups and will utilize a recording sheet made available through **Canva**, **Flipgrid**, **Kami,** or **Voki** to record their predictions and results.

EVALUATION

- Students will be evaluated through classroom observations throughout the lesson based on their ability to make predictions and test objects to determine if objects will sink or float.

UDL CONNECTIONS:

Multiple Means of Representation:
Guideline 1: Provide options for perception
-Checkpoint 1.2 Offer alternatives for auditory information.
This guideline is satisfied throughout the entire lesson.

- To display definitions of key vocabulary that are given in the video orally, the teacher uses charts with the vocabulary word in a different color, a definition or explanation of the vocabulary, and a picture.

-Checkpoint 1.3 Offer alternatives for visual information.

- Students have the opportunity to record their responses through the "Voki" app. This app is a text-to-speech generator. Personal speaking avatars that read text aloud is a great example of providing options for visual information for students.

Multiple Means of Engagement:
Guideline 7: Provide options for recruiting interest
- Checkpoint 7.1 optimize individual choice and autonomy
  - For the exit ticket, the teacher will give directions to the students orally, as well as supply a worksheet that reiterates the oral directions given. The exit ticket reflects UDL principles as the teacher gives his/her students as to how they want to display their knowledge (verbally, pictorially, or written.)
- Checkpoint 7.3 Minimize threats and distractions
  - Students are constantly kept engaged in the lesson and classroom is set up to minimize distractions. Teacher gives clear instruction and observes closely to make sure students are on task.
Guideline 8: Provide options for sustaining effort and persistence
- Checkpoint 8.2 Vary demands and resources to optimize challenge
  - Students begin with making predictions as to why objects sink or float. After watching a video and going through key vocabulary, students will participate in a smartboard sorting game and eggspert activity with their peers. Students will test their knowledge of sink or float by making a boat that sinks and a boat that floats with their group members. Students then complete an exit ticket individually and without teacher support to display their understanding of the material.
Multiple Means of Action and Expression:
Guideline 4: Provide options for physical action
- Checkpoint 4.1 Vary the methods for response and navigation
  - Students show with their bodies whether or not they think an object sinks or floats through sink/float motions.

Lesson 5

Teacher: General Educator, Kindergarten Teacher
Date: Day 5 of the Unit
Subject/Grade level: Science/Kindergarten
Materials: Google Slides, vocabulary cards made via Canva: sink, float, weight, size, shape, air inside, student devices
Technologies Implemented: In this lesson, the teacher will guide instruction through the use of Google Slides to display various learning materials. Additionally, Canva will be utilized to display important vocabulary and anchor charts created prior to the lesson to enhance student understanding of material. Wheel of Names will be utilized to encourage student participation and act as a means of partnering students to elicit collaboration and discission. Voki, Flipgrid, and Kami will be used for students to record responses in regard to the "summative assignment."
Lesson objective(s): Students will be able to plan and create a boat that floats by using information learned about sinking and floating and the factors that contribute to these actions.
Standard(s) Addressed   **ISTE-NTS-S**   Creative Communicator: Students communicate clearly and express themselves creatively for a variety of purposes using the platforms, tools, styles, formats, and digital media appropriate to their goals.   **6b.** Students create original works or responsibly repurpose or remix digital resources into new creations.   **6d.** Students publish or present content that customizes the message and medium for their intended audiences.   **Common Core Standards:**   **Standard 1.0 Skills and Processes (K.A.1): Students will demonstrate the thinking and acting inherent in the practice of science.**   Topic B. Applying Evidence and Reasoning   Indicator: People are more likely to believe your ideas if you can give good reasons for them.   Objectives   1. Provide reasons for accepting or rejecting ideas examined.   2. Develop reasonable explanations for observations made, investigations completed, and information gained by sharing ideas and listening to others' ideas.   3. Explain why it is important to make some fresh observations when people give different descriptions of the same thing.   Topic C. Communicating Scientific Information   Indicator: Ask, "How do you know?" in appropriate situations and attempt reasonable answers when others ask them the same question.   Objectives: 1. Describe things as accurately as possible and compare observations with those of others.   2. Describe and compare things in terms of number, shape, texture, size, weight, color, and motion.   3. Have opportunities to work with a team, share findings with others, and recognize that all team members should reach their own conclusions about what the findings mean.   4. Recognize that everybody can do science and invent things and ideas.   **NAEYC Standards**   **2.G.07**   a. Children are provided varied opportunities and materials that encourage them to discuss scientific concepts in everyday conversation   **2.G.08**

a. Children are provided varied opportunities and materials that help them learn and use scientific terminology and vocabulary associated with the content areas
2.H.02
All children have opportunities to access technology (e.g., tape recorders, microscopes, computers) that they can used by themselves.
b. collaboratively with their peers.
c. with teaching staff or a parent.
2.H.03
Technology is used to
a. extend learning within the classroom.
b. integrate and enrich the curriculum.

Differentiation strategies to meet diverse learner needs:

There are multiple means of engagement such as the use of technology, collaborative discussion, and partner talk.

ENGAGEMENT (5-10 minutes)
Through the use of **Google Slides**, remind students about the general idea of their challenge:

- Teacher will remind students of culminating event/summative assessment: To build the boy a boat that floats.
- Teacher will say, "Now I want to see how much you have learned throughout this unit about what makes an item sink or float. "
- Teacher will refer to Google Slides, switching from the slide about the experiment, back to the picture of the boy.
- Remind students that, "We can't forget about the little boy. With all of the learning we've done throughout this unit, I think we are ready to build our boats and get the boy safely back home."

EXPLORATION (15 minutes)

- Refer back to the BrainPOP JR. video and discuss why Moby's first boat of clay sank when he placed it into the water and why Annie's boat floated.
- Say, "Remember in the video when Moby built his first boat out of clay, he made it into a
- solid rectangle so the air could not get inside. It was heavier than the water and sank to the bottom of the clear tub. Annie told him that he needed to make his boat hollow because the air inside helps it float. Let's use what we learned from Moby and Annie's clay boats to make our own boat with our groups out of aluminum foil and rescue the little boy.
- In the same-colored groups as before, pick a spot in the classroom and sit on the floor together in a circle. You may get up now and then listen to me for more instructions once you are seated." Switch to slide with picture of the boy to a piece of aluminum foil and link to Sesame Street video.
- Once the students choose where they will sit with their group, show the students the piece of foil each group will get to make their boat. Say "I want everyone to work with their team to brainstorm how they will build their boat. Remember to think about what we learned today about how the size, shape, weight, and air in an object can make an object sink or float, when you are brainstorming." "To help you think of some ways you can build your boat out of foil, let's watch this sesame street video of students just like us."
- Watch video https://www.sesamestreet.org/toolkits/stem/sink-or-float
- As the students are watching the video the teacher will be giving out clear white tubs full of water to each group and the piece of foil. After the video is concluded and each group has their materials, tell the students to, "Use what you learned today about why objects sink and float to create a boat that will float in the water. Your goal with your group members is to create a boat that will float."
- Tell students that they can begin making their boat. Tell the students that they only have five minutes to create their boat with their group, so they need to work together. Give the children five minutes to manipulate the foil into a boat-like object. Teacher sets timer on board through presentation.

- As the groups of students create the boat, the teacher will walk around, observe conversations, and pay attention to the vocabulary the students use. He/She will also answer questions that the students have.

EXPLANATION (20 minutes)

- After the five minutes are up and the students are finished constructing their boats, tell them that they are going to make a recording through "Flipgrid" and test if the boat they made did float.
- Say, "You guys are so creative! These boats look great. We are going to put your boats to the ultimate test. Can your boat float in the water and save the boy from the deserted island? We are going to see in just a second.
- But first, I need a volunteer from each group to grab one device from the front of the room.
- One person from each group please come up to grab the iPad."
- Once every group has an iPad, ask for another volunteer to be the special recorder.
- Once the roles have been decided say, "My special recorders, I need you to unlock the iPad. Then, I need you to open up the "Flipgrid" app that we use each time we do a fun experiment to show what we've learned." (Teacher will use the Doc Camera to display her iPad. She will do each step with the students so that they locate the correct app and features within the app.). Say, "Now special recorders, please locate the "Who floats your boat?" prompt. Once it is open tap the "+" symbol at the top left corner." Give students a few seconds to locate the symbol. Once everyone is caught up, say, "Now tap the spot where it says, "Blank Project." Hit the plus symbol again and then tap on the green video camera that says "Video."
- Remind students that today we are going to take a video of what happens to your boat. In the video you are going to answer a few questions. Got it? Don't start yet"
- Teacher will show first how to start/stop a video. Say, "To start the video, you are going to tap the red dot by the zeros, you should see the numbers go up as the video records. (Ask to make sure everyone understands.) To stop the video, you are going to hit that same red dot again, you are going to see the numbers stop going up when you stopped the video. You know that your voice is recording when you see that the microphone at the bottom is white. Can everyone make sure theirs is white and not blue? After you have recorded your boat sinking or floating and have answered the questions, you can stop you video.
- Tell students, "Once your boat is in the water, see if it actually floats or if it sinks. Explain why you think it sinks or floats and what made you know it sank or float. Once your group has answered all the questions and the video recording has stopped, you may take out the boat and place it on the paper towels next to you.
- "So now that you all know what to do, these are the questions you have to answer for me in your video recording as your boat is in the water." Switch to slide that lists the questions they need to answer in the video. Orally give students the questions they need to answer and display the questions on the smartboard. (Questions will be: Did your object float or did it sink? How do you know that it floated or sank? What factors caused your boat to float or sink?) Remind the students that they will be speaking in the video to record their observations and responses to the questions.
- Students will record at their own pace.

ELABORATION (10 minutes)

- Once finished, choose a student using the Wheel of Names give their results to the class and explain why they made each boat that way and what happened when they placed their boats in water.
- Display via Google Slides the picture of boy back with his family. Say, "Look, the boy is back with his family. Which groups helped the little boy get back to his family?" The students who created boats that floated should raise their hands. Say, "Thank you for taking on the challenge!!"

EVALUATION

- During the lesson, students will be evaluated upon their responses within their assigned groups as well as their responses to the entire class when describing the boat in which they created. At the end of the lesson, students'

videos and answers to discussion questions will be used to measure their understanding of the terms float and sink, and the factors that cause an object to perform one of those actions in water.

UDL CONNECTIONS:

Multiple Means of Representation:
Guideline 1: Provide options for perception
-Checkpoint 1.2 Offer alternatives for auditory information.
This guideline is satisfied throughout the entire lesson.

- To display definitions of key vocabulary that are given in the video orally, the teacher uses charts with the vocabulary word in a different color, a definition or explanation of the vocabulary, and a picture.

Multiple Means of Engagement:
Guideline 7: Provide options for recruiting interest
- Checkpoint 7.1 optimize individual choice and autonomy
- For the exit ticket, the teacher will give directions to the students orally, as well as supply a worksheet that reiterates the oral directions given. The exit ticket reflects UDL principles as the teacher gives his/her students as to how they want to display their knowledge (verbally, pictorially, or written.)
- Checkpoint 7.3 Minimize threats and distractions
- Students are constantly kept engaged in the lesson and classroom is set up to minimize distractions. Teacher gives clear instruction and observes closely to make sure students are on task.
Guideline 8: Provide options for sustaining effort and persistence
- Checkpoint 8.2 Vary demands and resources to optimize challenge
- Students begin with making predictions as to why objects sink or float. After watching a video and going through key vocabulary, students will participate in a smartboard sorting game and eggspert activity with their peers. Students will test their knowledge of sink or float by making a boat that sinks and a boat that floats with their group members. Students then complete an exit ticket individually and without teacher support to display their understanding of the material.
Multiple Means of Action and Expression:
Guideline 4: Provide options for physical action
- Checkpoint 4.1 Vary the methods for response and navigation
- Students show with their bodies whether or not they think an object sinks or floats through sink/float motions.

Sample Technology Products

- Wheel of Names: Names listed are not actual names of students in the given class, for

  confidentiality purposes.

- Canva: Utilized to create vocabulary cards/anchor charts for the unit and worksheets/exit tickets

  for students to demonstrate their understanding with the content

- Flipgrid: Example topic/prompt where students can post a video to meet the requirements of the

  assignment

Written Paper

Design Process and Rationale

The unit and corresponding lessons discussed throughout this assignment were designed with the use of technology to reflect grade-level standards, utilizing Gagne's Nine Events of Instruction, Next Generation Science Standards (NGSS) and with UDL principles in mind.

According to Gagne, Briggs, and Wager (1992), a lesson should include nine elements of instruction to effectively deliver content and develop a deep understanding of curricula amongst learners. The nine elements include: "gaining the attention of students, informing students of the objective(s), stimulating recall of prior learning, presenting the content, providing learning guidance, eliciting performance, providing feedback, assessing performance, and enhancing retention and transfer of learning." A key component of Gagne's instructional design process is its ability to allow teacher-delivered instruction to connect with students in a way that is suitable to their individual learning style. Through this manner, students achieve more optimal learning outcomes as instruction is delivered and constructed using different modalities (Halpern & Hakel, 2003.) The technology used throughout each lesson supports multiple teaching and learning styles. Every student learns differently, as determined by

various learning styles, whether it be visually, auditorily, through reading and writing, or kinesthetically

(Learning Styles n.d.). Therefore, throughout this unit students are given choice in demonstrating their

understanding of content by being given the opportunity to choose the method that works best for them.

The students are able to visually see and read the content displayed on their devices through Nearpod,

they can hear the content displayed in Kami's text to speech application, and they can physically engage

with the content using the interactive interface of Google Slides. Students can also choose to respond to

prompts visually using text or drawing in Nearpod and Kami, or through video with Flipgrid, auditorily

using Flipgrid or Kami, or physically again with Google Slides. Thus, throughout this unit, teachers

utilize Gagne's instructional design process to guide instruction, examine student observation and provide

ongoing formative assessments, to determine how the standards will be taught, reinforced, or extended.

The science unit discussed is designed to meet the requirements of NGSS in conjunction with

Gagne's Nine Events of Instruction, as it engages students in interdisciplinary applications and learning.

The NGSS were designed to engage students in practices to build, deepen, and apply their knowledge of

core ideas and crosscutting concepts through an "inquiry based" approach, in order to allow students to

make real-world connections (NGSS Lead States, 2013). The learning experiences made available

through the use of technology provided, engages students with fundamental questions about the world, in

order to spark curiosity, guide instruction, and stimulate investigations that allow students to apply their

knowledge and ideas in real-world settings. All lessons are created to investigate, study, and answer an

"Exploration Question." Every lesson is created for students to develop questions and investigate

inquiries as scientists, social scientists, environmentalists, engineers, and informed citizens. With support,

students will also apply disciplinary cross-cutting concepts, practices, core ideas and tools. Students will

be encouraged to observe, collect, and evaluate data, and communicate conclusions thus taking informed

action.

Due to the student population in which the unit will be implemented, students' various learning

styles were considered when developing and adapting the unit of instruction, thus utilizing UDL

guidelines. The Universal Design for Learning (UDL) guidelines ensure that all students can access and participate in meaningful, challenging learning opportunities as presented by a set of concrete suggestions that can be applied to any content area. These suggestions address multiple means of engagement, representation, and action and expression, to meet a wide range of learning styles and preferences (CAST, 2018). Thus, the unit of instruction utilizes UDL as students are provided with various ways in which instruction is delivered, as well as multiple opportunities and methods to demonstrate their learning, in conjunction with the use of technology.

The unit discussed further integrates technology into instruction, to provide advances in learning and increase student engagement. Additionally, the technology chosen promotes collaboration, discussion, and problem-solving amongst learners. Examples of technology incorporated throughout the unit include: Nearpod, Kami, Flipgrid, Google Slides, Poll Everywhere and Wheel of Names. To support collaboration amongst students, Nearpod, Flipgrid, and Google Slides have been implemented amongst lessons throughout the unit, as students can work on an assignment at the same time as their peers at an individual, small group, or whole-group level. These technology tools also allow students to "see" their peers' work in order to gain an understanding of how the other learners in their class approached the assignment or task. The technology tools, Poll Everywhere and Wheel of Names are utilized throughout the unit lessons to get all students involved in the discussion, as these teacher-created tools can be used in a multitude of ways to enhance student engagement. Additionally, Kami supports student problem-solving as students are given the opportunity determine the best way to work through the material presented.

Assessment

Within this unit, multiple forms of assessment are utilized to guide instruction and respond to student's varying levels of understanding. In some instances, the technology implemented to support student learning has also been incorporated to assess student growth and achievement. Various forms of

assessment such as observations, anecdotal notes, formative assessments, and summative assessments are embedded within the science unit, and can be used to adapt or guide instruction as needed.

One example of a formative assessment utilized within this unit, includes the use of the "Educational Insights Eggspert Device/Game." This assessment addresses the learning outcome that asks students to, "predict which items will sink and which items will float." Through this assessment, students have the opportunity to participate in an interactive game that will test their knowledge of sink and float. Students will have the opportunity to compete against their peers and show their understanding of sink and float concepts by providing a prediction and reasoning behind their prediction, based upon the four factors discussed and the definitions of sinking and floating.

Furthermore, exit tickets are used at the end of each lesson to provide the teacher with feedback on student's level of understanding at the end of each lesson. One "exit ticket" incorporated throughout the unit will include a worksheet that will be completed individually to assess students' knowledge of the concepts/words, "sink" and "float." Students will be asked to draw one boat design that sinks, and one that floats. Students will also be asked to provide at least two factors discussed throughout the lesson that contribute to whether or not an object floats or sinks. After completing the exit ticket, teachers will assess how the students draw/ position their boats on top of or below the surface of the water in their drawings, and the factors that they provide (looking for weight, size, shape, air inside.) With this assessment, students are provided with a choice to demonstrate their understanding. Students have the option to draw or type their answers to the prompt using the "ShowMe" app. Students can also choose to verbally explain a boat design that sinks and one that floats, as well as factors that contribute to an object floating or sinking, through the "Flipgrid" app. By providing students with a choice, students take ownership of their learning and thus autonomy of one's learning is encouraged.

Additionally, assignments and assessments throughout the unit can be created and submitted using Schoology and/or Google Classroom. Both of these learning management systems allow teachers to create assignments and quizzes to be completed by students via the online platform and have the

capability to be housed all in one place. Based on teacher set-up, assignments can be automatically scored, thus providing immediate feedback for students and teachers to be used to guide instruction before the next concept or skill is introduced.

Selection of Technology and Resources

When choosing the technology to incorporate within the unit, collaboration and engagement amongst teachers and students was a key factor in determining which types of technology should be utilized to promote learning and the delivery of instruction. Two of the technology platforms utilized throughout the unit, "Wheel of Names" and "Poll Everywhere," are tools that can be used by teachers to gain information from students in an equitable way. Similar to "equity sticks," in which teachers "pick" a stick with a student's name to answer a question aloud, "Wheel of Names," allows student names to be displayed and chosen upon random in a fun, interactive way. Similarly, "Poll Everywhere" allows teachers to create a multiple choice, word cloud, or question and answer activity in which students can engage and collaborate regarding a specified topic. These assignments can then be displayed, and students can access student responses, if needed.

To promote collaboration amongst teachers, Google Slides are utilized to allow access to content amongst educators. Additionally, Google Slides can link Flipgrid, Nearpod, Wheel of Names, and Poll Everywhere to the instructional slides, so that all teachers have access when delivering content. Google Slides can be shared with other teachers by clicking the share button and adding collaborator's emails or by sending a link to the slide deck. Not only can educators make copies of one's slide deck, but they can also edit or adapt it to meet the needs of the learning styles in their classrooms, thus enhancing student learning through the use of this collaboration tool.

Diversity

Considering each student's unique learning needs and interests, the unit was designed with UDL guidelines in mind in order to promote a diverse learning environment and address each learner's varying backgrounds.

According to Ohio State University (2015), the first guideline outlined by UDL explains that every lesson should provide, "multiple means of representation." This guideline is satisfied throughout the entirety of the unit discussed, as the introductory video from BrainPOP Jr. that is shown to the students to introduce the words, "sink" and "float" includes captions, as well as an auditory component. This allows students to hear what the characters are saying and refer to the words at the bottom of the video, if needed. To display definitions of key vocabulary that are given in the video orally, the teacher uses charts with the vocabulary word in a different color, a definition or explanation of the vocabulary, and a picture. Additionally, in accordance with Checkpoint 1.3, alternatives for visual information are provided throughout the unit. Through the interactive Google Slide sort, the educator will read the words "sink" and "float" by pointing to each category as he/she says the word. The teacher will also discuss with the class (before having volunteers sort the objects), the name of each object while pointing to it. I.e., Apple, Teacher will point to the apple and say, "apple." Furthermore, students have the opportunity to record their exit ticket responses through the "Voki" app. This app is a text-to-speech generator. Personal speaking avatars that read text aloud are a great example of providing options for visual information for students.

Principle 2 of the UDL framework involves using "multiple means of engagement." For the exit tickets given, the teacher will give directions to the students orally, as well as supply a worksheet that reiterates the oral directions given. The exit tickets reflect UDL principles as the teacher will give his/her students the choice as to how they want to display their knowledge (verbally, pictorially, or written.) Students are continuously engaged in the lesson and the learning environment is set up to minimize distractions. Students begin the unit with making predictions as to why objects sink or float. After watching a video and going through key vocabulary, students will participate in a sorting game and an

"Eggspert" activity with their peers. Students will then test their knowledge of sink or float concepts by making a boat that sinks and a boat that floats with their group members.

Lastly, educators are encouraged to implement "multiple means of action and expression" in their lessons to meet student's diverse learning styles. Students show with their bodies whether or not they think an object sinks or floats through sink/float motions throughout the unit. Students are asked to use their finger to sort during the interactive sorting game, promoting fine motor movements. Additionally, students must get out of their seats and walk to the smartboard or interactive whiteboard. The Eggspert game utilized causes students to move quickly in order for them to get a turn in providing their prediction. Each of these elements of instruction embedded within the unit promote a high-level of engagement amongst learners due to meeting the needs of all learners.

Adaptive and Assistive Technology

Within the realm of education, there are a wide range of terms used to describe the use of the technology in the classroom. Two terms often describing the use of technology in the educational setting are "adaptive technology" and "assistive technology." Adaptive and/or assistive technology is, "any piece of technology that helps a student with or without a disability to increase or maintain his/her level of functioning" (Technology for All, n.d.). As described and utilized in this unit, Kami is an assistive technology that can be used to support instruction, as it supports students' academic success with the many annotating functions. Kami also reads the text on a given page to students. These functions create an inclusive classroom for all learners, but especially for students with learning disabilities or ELL's. Furthermore, assistive technology can be incorporated in the classroom at varying levels, ranging from low to high. Some examples of assistive technology throughout this continuum include, pencil grips (low level), calculators (mid-level), and speech recognition software (high level) (Maryland Assistive Technology Network, n.d.). Regardless of the level of technology used, these technologies assist students in demonstrating their learning.

Digital Citizenship

Due to the high-level of technology incorporated within this unit of instruction, and the various technology platforms used, educators have the responsibility to demonstrate appropriate digital citizenship practices and inform students of these practices, as well. As video clips are incorporated into some of the lessons to enhance instruction, the educator will ensure the videos shown adhere to copyright laws, by only showing videos with content related to the unit and only showing short clips (OSU, 2015). When using Flipgrid, students will be instructed on how to properly navigate the learning tool in accordance with the school system's terms of use. Flipgrid, however, further ensures students' videos are protected through the requirement of passwords and class codes. In addition, classes will be archived after the school year has ended. By doing so, educators can prevent unauthorized transmission of copyrighted materials (OSU, 2015.)

Ethics

Educators have a commitment to each learner in their classroom, as they must provide equal and appropriate learning opportunities for each student to participate in within their classroom setting (AECT, 2018). Due to the various learning opportunities and levels of technology implemented within the science unit, every learner has the opportunity to access the content being taught. Through the use of "Nearpod," "Google Classroom" and "Schoology," teachers have the ability to see, in real time, misconceptions amongst student learning. Thus, educators can then target student instruction through small group or re-teach opportunities. With the use of "Wheel of Names," every student has the opportunity to participate in the lesson, through its ability to randomly select names to guide student participation. Through "Voki" and "Kami," students are able to demonstrate their level of understanding in various ways.

In addition, educators must uphold an ethical perspective when conducting professional activities, as they must protect the privacy of all learners (AECT, 2018.) As students submit assignments through Google Classroom, Schoology, and other learning management platforms, other students cannot see their

peers' assignments. A student only has access to what they submitted, thus protecting the students' privacy, as other students do not have access to each other's work. Students are further protected as these learning management systems require classroom codes to access materials submitted work, discussions, posts, and comments. It is vital that only technology platforms permitted by one's school system are utilized with students, in order to protect each individual's safety and confidentiality.

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