

Welcome to Parent University!

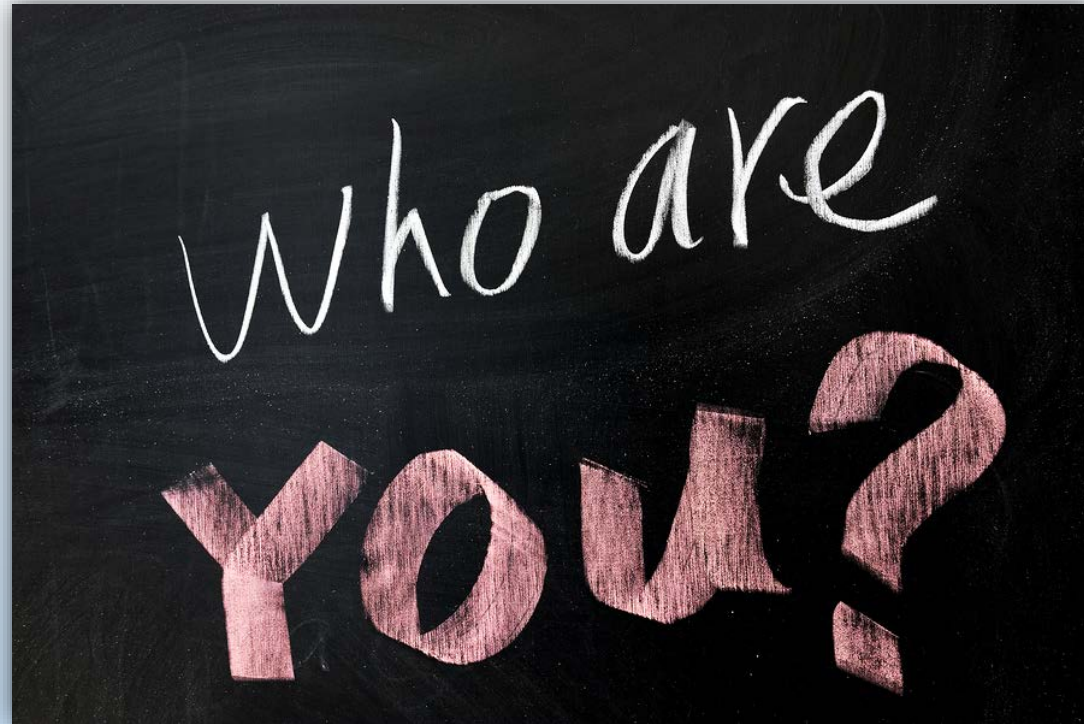
# Exploring the Inquiry-based Science Classroom

Polk County Public Schools

Introductions Are in  
Order...

# Who Are We?

- Dr. Jackie Speake – Senior Director for Science
- Dr. Milton Huling – Elementary Science Curriculum Specialist
- Karrie Wikman – Secondary Science Curriculum Specialist
- Cheryl Fogel – Elementary Science District Coach
- Dr. Marjorie Miles-Dozier – Science District Coach
- Kim Rex – Middle School Science District Coach
- Polly Burkhart – Regional Science Coach
- La-Chaz Harris – Regional Science Coach
- Dr. Wardell Powell – Regional Science Coach



Who is your student  
and what school does he or she attend?



# Coffee Talk

We are currently preparing students for jobs that don't yet exist and teaching them to use technologies that haven't been invented, in order to solve problems we don't even know are problems yet. We are living in exponential times.

*How does this impact education?*



[Kaempffert, W., Miracles You'll See in the Next Fifty Years.](#)  
[Popular Mechanics,](#)

- *Men shave with chemical creams.*
- *Dishes are disposable.*
- *Microwave ovens will replace conventional ovens.*
- *Precooked foods*
- *The new TV sets will be in everyone's home, and they double as video telephones.*
- *Computers will give accurate predictions of the weather by solving the equations for the movement of air.*

**February 1950**

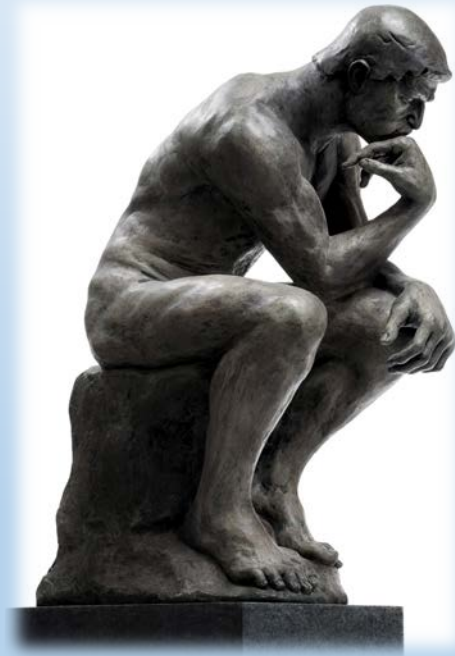


# What does it all mean?

- The top 10 in-demand jobs in 2010 didn't exist in 2004.
- A week's worth of The New York Times contains more information than a person was likely to come across in a lifetime in the 18th century.
- The number of text messages sent and received every day exceeds the planet's population.
- For a student starting a four-year technical or college degree, half of what they learn in their first year of study will be outdated by their third year.
- By 2023, a \$1,000 computer will exceed the capabilities of the human brain.
- By 2049, predictions are that a \$1,000 computer will exceed the computational capabilities of the human race.



What does good (and effective) science instruction look like?







# Why Inquiry?

## Research...

- Coulson (2002) found that students whose teachers taught with medium or high levels of fidelity to the BSCS 5E Instructional Model experienced learning gains that were nearly double that of students whose teachers did not use the model or used it with low levels of fidelity.

# Why Inquiry?

## Our Results...

- Gibbons St. El 37 to 65
- Griffin El 22 to 42
- Kingsford El 45 to 61
- Lena Vista El 28 to 50
- Lewis Anna Woodbury El 16 to 39
- Palmetto El 29 to 62
- Philip O'Brien El 28 to 43
- McLaughlin Middle 30 to 52

# Why Inquiry?

What about all Kids? -Dispelling the reading myth...

	Level	Percent Proficient
2010-2011 (direct instruction)	Regular	11%
	Advanced	95%
	Total	24%

	Level	Percent Proficient
2013-2014 (with inquiry)	Regular	50%
	Honors	100%
	Total	58%



# 5E Instructional Model

# Can You Hear Me Now?

5E Instructional Model

Part 1-Sound



# Benchmark

**SC.7.P.10.3** Recognize that light waves, sound waves, and other waves move at different speeds in different materials.



# Guiding Question

How do the physical properties of a substance affect the speed of a wave?

# Engage

Do sound waves travel better through a gas, liquid, or solid?

*Activity Sheet*



Support with evidence from real-world experiences.







What is the purpose of *Engage*?



# Explore

Follow the directions on your *Can You Hear Me Now?* activity sheet, in order to assemble a cup-and-string phone.

*Activity Sheet*





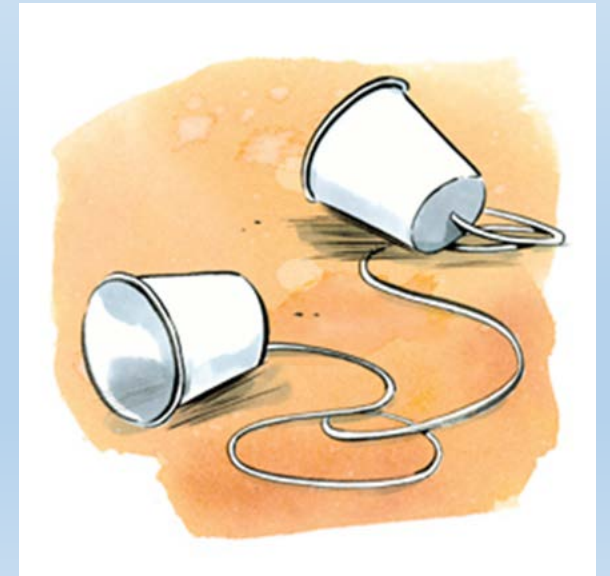
# Explore-continued

Hold the string tightly between two people. Take turns with one person speaking and the other listening.

Record what happens when you...

- change the volume of your voice.
- change the frequency (pitch) of your voice.
- let the string droop.
- make a party line!

*Activity Sheet*





Why *Explore* before *Explain*?

# Explain

1. Are high or low frequencies (pitches) transmitted better?
2. Could a soft voice be heard from one end of the classroom to the other without your telephone?
3. Could a soft voice be heard through your telephone?
4. Do sound waves travel better through the solid string or through the gaseous air?
5. How would your results change if the tightness or density of the string changed?

*Activity Sheet*



# Explain-continued

Listen to [\*How Sound Waves Work Underwater\*](#) (Podcast, Indiana Public Radio, 2:03)

6. How do sound waves travel in water as compared to the air?
7. How does density of a material affect how a sound wave travels?
8. **How do you think the speed of a wave compares as it goes through a gas, a liquid, and a solid?**



*Activity Sheet*





Who is doing the *explaining* and  
why?

# Elaborate

View Science on the SPOT: [\*Sound Waves—Listening to Orcas\*](#)



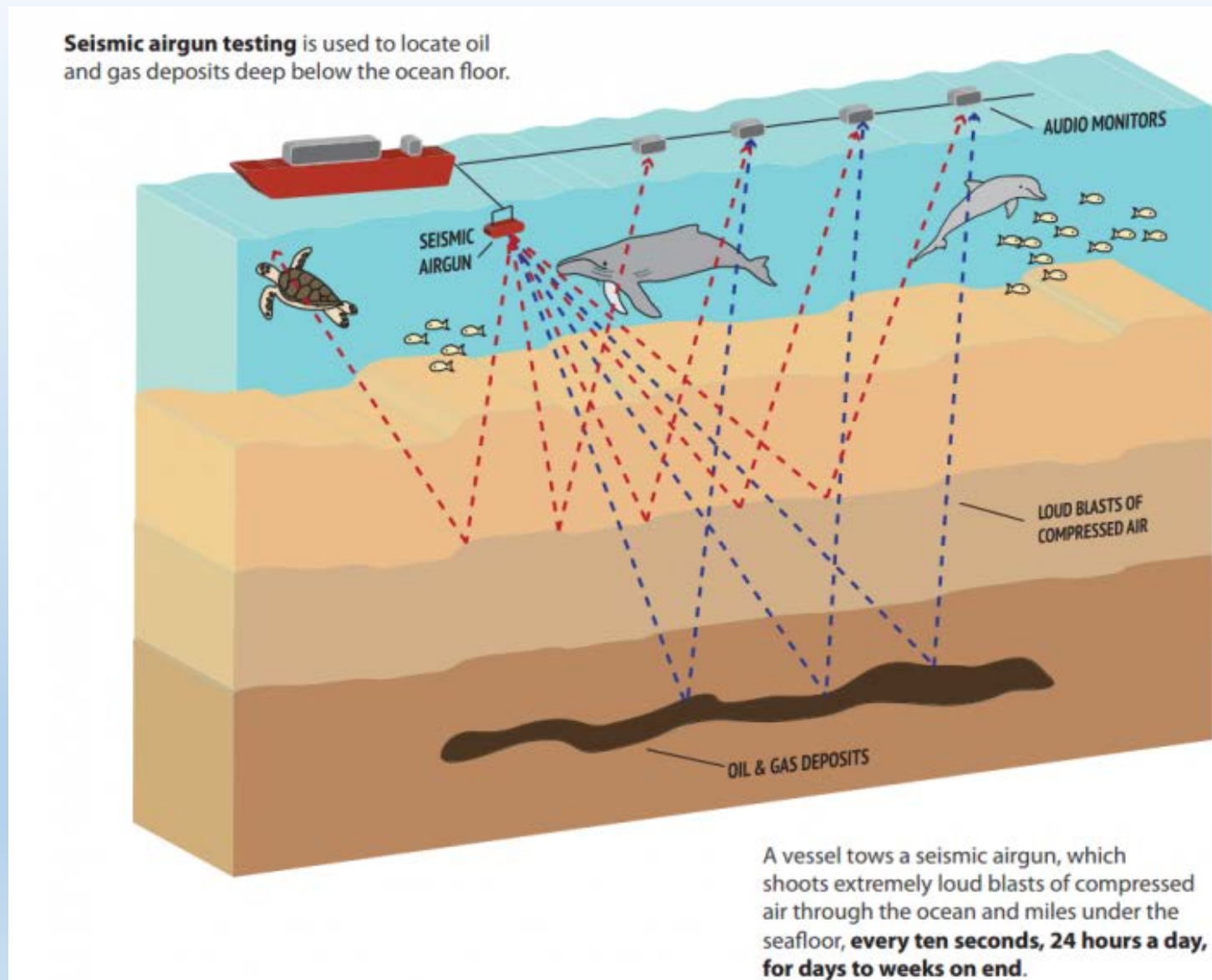
Veirs says, if you want to know what it's like to be an orca, imagine living under the flight path of an airport and next to a train station at the same time.



# Elaborate-continued

## Close-Reading: *Oil Companies to Blast in Atlantic Whale Waters*

- Circle the reason why oil companies are blasting seismic cannons in Atlantic whale waters.
- Code the article
  - P—Pros; reasons for blasting the seismic cannons
  - C—Cons; reasons against blasting the seismic cannons
- Make a claim as to whether or not the seismic cannon blasts should occur. Support your claim with evidence from the article.





What is the purpose of *Elaborate*?



# Evaluate

*Activity Sheet*



**Creative Writing:** You are either a baleen or toothed whale and you are trying to convince human beings to cut down on the noise from recreation and industry. Cite evidence from this lesson to convince the reader.

- Include a comparison of the speed of waves through gases, liquids and solids.

Baleen whales such as blue whales, right whales, or humpback whales can vocalize and hear very low-pitched, or infrasonic sound which can travel great distances.

Toothed whales such as bottlenosed dolphins, beluga whales, or orcas, vocalize and hear high-pitched, ultra-sonic sound.



Where else does *evaluation* occur?



# What about Assessment?

- Florida Department of Education ([fldoe.org](http://fldoe.org))
  - Click Accountability
  - Click Assessment
  - Click FCAT 2.0 or EOC Assessments
- Spring Break Biology Review ([Moodle](#))
  - Login to Moodle with student credentials.
  - Click BIO EOC Review
  - Enter the enrollment key, “eoc123”

It was wonderful exploring with you.

- Contact Karrie Wikman with questions or concerns.
- [karrie.Wikman@polk-fl.net](mailto:karrie.Wikman@polk-fl.net)