FOSS for all Students
Access and Equity

NSTA Atlanta 2018
Goals

• Define what access and equity means in your science teaching and learning environment
• Explore a FOSS investigation through the lens of access of equity
• Discuss assets and supports students need to be successful in science and engineering
Stay to the End

• Fill out the evaluation form
• Drawing for $75.00 gift certificate
• Link to today’s PowerPoint
FOSS is a complete, modular, research-based curriculum developed at the Lawrence Hall of Science with support from the National Science Foundation.
Module Components

For Teachers
Investigations Guide and Teacher Resources

For Students
FOSS Science Resources

Equipment
Equipment Kit with materials for 32 students
- 3 class uses – elementary
- 5 class uses – middle school

Technology
Access to FOSSweb for all technology resources
FOSS Active Investigation includes:

- Hands-on activities
- Science notebooks
- Science-centered language development
- Technology-based activities
- Formative assessment
- Outdoor activities
What does EQUITY mean to you?
Equity means every child receives what he or she needs to develop to his or her full academic and social potential.
Removing the predictability of success and failure that currently correlates with any social or cultural factor
Interrupting inequitable practices, examining biases, and creating inclusive school environments for all
Discovering and cultivating the unique gifts, talents and interests that every human possesses.
Promoting scientific literacy among all the nation’s people is a democratic ideal worthy of focused attention, significant resources, and continuing effort. The standards should reflect high academic goals for all students’ science and engineering learning and all students should have adequate opportunities to learn.
Areas to consider for access and equity

- Student engagement
- Classroom support strategies
- School support system
- Home and community connections
Attending to diverse student groups

• Accountability groups (NCLB, ESEA)
  – Economically disadvantaged
  – Students from major racial and ethnic groups
  – Students with disabilities
  – Students with limited English proficiency

• Additional groups
  – Foster children
  – Students learning standard English
  – Girls, women
  – Advanced learners
  – Students struggling with literacy
FOSS for all students

• All students come to school with language and a wealth of knowledge and experiences that can be tapped into to enrich the learning experience for everyone.
• All students benefit from actively investigating scientific phenomena and engaging in the engineering design process.
• All students are capable of constructing meaning through collaborative social interactions.
Take notes as you engage in the investigation.

<table>
<thead>
<tr>
<th>Student engagement and classroom support</th>
<th>School support systems</th>
<th>Home and community Connections</th>
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<tbody>
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PURPOSE

Students conduct a controlled experiment to gather data to explain an aspect of the phenomenon of permanent magnetism. This is foundational to design and test electromagnets.
What happens when a magnet comes close to another magnet?

What causes magnets to attract or repel at a distance?

What evidence of energy is there when magnets attract or repel?
What happens when a magnet comes close to another magnet?

What causes magnets to attract or repel at a distance?

What evidence of energy is there when magnets attract or repel?

The force, or the push or pull, between magnets is called the force of magnetism.

The force of repulsion pushes magnets apart.

The force of attraction pulls and holds magnets together.
What happens to the force of attraction between two magnets as the distance between them changes?

Materials:
1 FOSS balance
2 plastic cups
1 doughnut magnet
1 magnet-on-a-post
25 large washers
How will you measure the strength of the force of attraction between two magnets? What units will you use?

Work in your groups to determine the amount of force (number of washers) it takes to break the force of attraction between the two magnets.
Report the force of attraction

- Record how many washers it took to break the force.
- *How can you explain the results?*
What do you think will happen to the force of attraction between your two magnets if you put a plastic spacer between the two attracting magnets? Will the force become stronger, weaker, or stay the same?

Write a prediction:
When I put a plastic spacer between the magnets, the force will ..........................
I think this will happen because .............................................
What do you think will happen to the force of attraction between your two magnets if you put a plastic spacer between the two attracting magnets? Will the force become stronger, weaker, or stay the same?

Write a prediction:
When I put a plastic spacer between the magnets, the force will ..................................
I think this will happen because .................................

Your challenge:
- retest the number of washers needed to break the force with no spacers;
- find out how many washers are needed to break the force when you place one plastic spacer between the two attracting magnets.
### Recording the Results

<table>
<thead>
<tr>
<th>Distance (spacers)</th>
<th>Force (washers)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Do not test yet.</td>
</tr>
<tr>
<td>3</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td></td>
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</tbody>
</table>

Continue your experiment, but SKIP two spacers for now!
Graph the Data

Sample Data

<table>
<thead>
<tr>
<th>Distance (spacers)</th>
<th>Force (washers)</th>
</tr>
</thead>
<tbody>
<tr>
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<td>20</td>
</tr>
<tr>
<td>1</td>
<td>12</td>
</tr>
<tr>
<td>2</td>
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<tr>
<td>3</td>
<td>7</td>
</tr>
<tr>
<td>4</td>
<td>6</td>
</tr>
</tbody>
</table>
Force and Distance Relationship

Force (in washers)

Distance (in spacers)
Make a prediction using the graph

• Draw a best-fit line connecting the data points.
• Discuss a rationale for your prediction with a partner using a cause-and-effect explanation.

  *I think … because …*
  
  *When … then …*

• Test your prediction.
Sense Making Circle

When scientists share their own ideas, they may say...

- I observed...
- I noticed...
- My data show...
- I think... because...
- I wonder...
What happens to the force of attraction between two magnets as the distance between them changes?

Include evidence from your data to support your answer.
Poster Discussion

- Discuss the assets or “funds of knowledge” students bring to the lesson.
- What aspects of the lesson were particularly effective for these students?
- What additional supports might they need to fully engage? (Refer to the FOSS Access and Equity Chapter)
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• Drawing for $75 Gift Certificate!