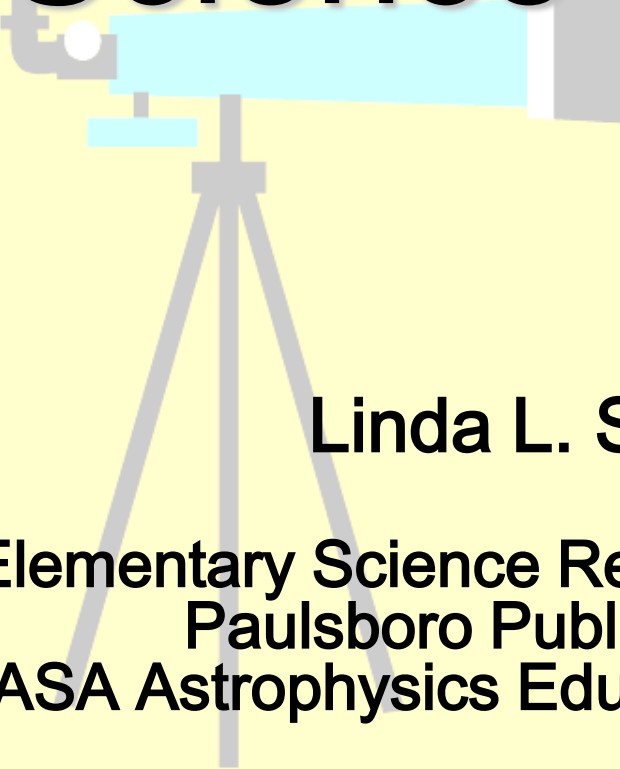




Key Components of Every Great Science Lesson



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Soo.. What is this Inquiry based stuff?

- Science is the process of thinking
- Students are responsible for their own learning
- Students are active participants
- Creates a sense of ownership within students
- Provides an opportunity to practice every other discipline

You Start With a Problem

- You ask the question
- Students record the question on their lab sheet

Problem

Can air hold up water?

Students write a hypothesis

- Students tell you what they think the answer to your question is before they do the experiment.
- Must tell what they think **AND** why
- Must be written in complete sentences

Problem

Can air hold up water?

Hypothesis

No, air can not hold up water
because water is heavier than
air

Problem
Can air hold up water?
Hypothesis
No, air can not hold up water because water is heavier than air

Procedure

- In the best of all possible worlds, the students develop a plan to prove their hypothesis and record it in their lab sheet
- In 40 minute classes I develop a plan to prove their hypothesis and they record it in their lab sheet
- I insist that all steps are numbered and start on a new line.

Problem

Can air hold up water?

Hypothesis

No, air can not hold up water because water is heavier than air

Procedure

1. Fill cup with water
2. Put plate over cup
3. Press plate firmly with palm of hand
4. Flip and let go

Results

- Students do the experiment.
- We come back together as a group to discuss what happened
- Students list what happened in their lab sheet

Problem

Can air hold up water?

Hypothesis

No, air can not hold up water because water is heavier than air

Procedure

1. Fill cup with water
2. Put plate over cup
3. Press plate firmly with palm of hand
4. Flip and let go

Results

The water stayed in the cup.

Conclusion

- From the results we conclude what must be happening
- Students write their own text books

Problem

Can air hold up water?

Hypothesis

No, air can not hold up water because water is heavier than air

Procedure

1. Fill cup with water
2. Put plate over cup
3. Press plate firmly with palm of hand
4. Flip and let go

Results

The water stayed in the cup.

Conclusion

We are swimming in a sea of air all the time. There is so much air around us and piled on top of us that it pushes with a force of 14.7 pounds for every square inch of stuff. In a natural state, air takes up all the spaces in the cup, around the cup and around the water.

When you flip the cup the air around the cup is actually pushing harder than gravity can pull the water in the cup, so the water stays inside the cup....held by the pressure of the air around it.

SCIENCE RULES

1. Respect any and all people
2. Take responsibility for your education
3. Do your best at all times
4. Hand in only your very best work
5. Use your self-control to pay 100% attention when Mrs. Smith is teaching.
No calling out during instruction time.
6. Stay in your seat during instruction
7. Take excellent notes
8. Believe in yourself
9. All comments must be positive, neutral, or not made at all.

IF You Break A Rule

1st time - Warning - now you know

2nd time - Dear Mom Letter (lets all of us know why you chose to break the rule)

3rd time - Out until Mrs. Smith meets with Mr. Blake

4th time - Out until Mrs. Smith meets with your parents

_____ and I have read and discussed the science rules. (Child's name)

We understand why we have these rules and are willing to accept the consequences if we choose to break them.

_____ Parent's signature

_____ Student Signature

Assign Jobs to Each Group Member

- **PI** – Principle Investigator
 - Is in charge of the experiment
 - Makes sure every person gets to do something
- **MM** – Materials Manager
 - Is in charge of getting materials to the group leader
- **MD** – Maintenance Director
 - Is in charge of cleanup
- **SD** Security Director
 - Makes sure the group “practices safe science”
- All group members are responsible for their own notes

Insist on Good Discipline

- Discipline means doing what's right even if you want to do something else
- Only call on people with good discipline to be your volunteers
- When students act inappropriately say “Darn...I was going to pick you next, but now I can't because
....
And immediately pick someone else that is cooperating
- Reward students for positive discipline

Name

5 points for getting your name right

Problem

Can air hold up water? **10 points for copying the problem right**

Hypothesis

25 points for what you think

No, air can not hold up water because water is heavier than air

Procedure

10 points for copying the procedure accurately

1. Fill cup with water
2. Put plate over cup
3. Press plate firmly with palm of hand
4. Flip and let go

Results

20 points for observing what happened correctly

The water stayed in the cup.

Conclusion

30 points if they get the concept

We are swimming in a sea of air all the time. There is so much air around us and piled on top of us that it pushes with a force of 14.7 pounds for every square inch of stuff. In a natural state, air takes up all the spaces in the cup, around the cup and around the water.

When you flip the cup the air around the cup is actually pushing harder than gravity can pull the water in the cup, so the water stays inside the cup....held by the pressure of the air around it.

Grading Hands-on Science

- Grade Group Participation
 - Give students matrix before the experiment starts
 - Let students fill out matrix for people they are working with
 - Average all grades
- Allows students to know exactly what is expected of them
- Holds students accountable for their education

Participation Matrix

Action	Points
<u>Stay In Group</u> : Student stays with his team partners during the entire experiment. Resist the temptation to wander around to other groups. (20 points)	
<u>Participating</u> : Students take an active role in the experiment. Resist the temptation to sit back and allow one or two individuals do everything. (20 points)	
<u>Group Organizing</u> : Students work out for themselves which job they will do. Make sure that everyone has a job, and that everyone does their job to make the experiment work. (20 points)	
<u>Working Together</u> : Group members work out problems between themselves. They police their own group. Refrain from asking the teacher to settle differences. (20 points)	
<u>Listening</u> : All ideas are listened to and accepted as part of a body of knowledge. (20 points)	
Total grade : (100 points)	

Where to Get More Information



www.crystalballscience.com