

Using Literacy Strategies to Improve Comprehension in Math and Science

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What the Research Says

For maximum learning, students need prior knowledge about the topic being studied and they need to relate that prior knowledge to the contents of the passage.

-- Readence, Moore, and Rickelman

At the root of deep understanding of science concepts in scientific processes is the ability to use language to form ideas, theorize, reflect, share and debate with others, and ultimately, communicate clearly to different audiences.

--Karen Worth, Center for Science Education

Literacy Strategies Can be Applied in Math and Science

- Before Learning Strategies
 - During Learning Strategies
 - After Learning Strategies
 - Vocabulary Development
 - Activities that Support Learning
 - Benefits Measured in Student Achievement
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Strategies to Use Before Learning to Activate Prior Knowledge

- Think Aloud
 - Browse Through Texts
 - Brainstorm / Categorize
 - Use Graphic Organizers
 - Pose Questions / Discussions
 - Pre-teach Vocabulary Concepts
 - Preview and Analyze
 - K-W-H (What do I know? What do I want to know? How will I find out?)
 - Anticipation Guide
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Strategies to Use During Learning

- Visualize
 - Use Graphic Organizers
 - Take Notes
 - Pose Questions
 - Think Aloud
 - Use Context Clues
 - Summarize
 - Retell
 - Reread
 - Infer
 - Make Personal Connections
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Strategies to Use After Learning

- Skim
 - Reread
 - Think Aloud
 - Pose Questions
 - Connections
 - Reflect
 - Graphic Organizers
 - Summarize
 - Retell
 - Synthesize / student generated quiz
 - Self-evaluate
 - Infer: Compare/contrast, Cause/Effect, Main Idea
 - Apply
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Six Step Process For Building Academic Vocabulary

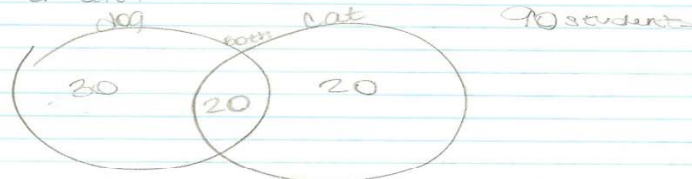
- **Step 1:** The teacher will give a description, explanation, or example of the new term.
 - **Step 2:** The teacher will ask the learner to give a description, explanation, or example of the new term in his/her own words.
 - **Step 3:** The teacher will ask the learner to draw a picture, symbol, or locate a graphic to represent the new term.
 - **Step 4:** The learner will participate in activities that provide more knowledge of the words in their vocabulary notebooks.
 - **Step 5:** The learner will discuss the term with other learners.
 - **Step 6:** The learner will participate in games that provide more reinforcement of the new term.
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Activities That can be Incorporated to Improve Literacy in Math and Science

- Solve it. Explain it.
 - Justify
 - Support your reasoning
 - How will you defend your answer?
 - Dialogue Journals
 - Headlines from Newspaper
 - Good, Better, Best
 - Include descriptive writing (ex. Building with toothpicks).
 - Learning Log
 - Word Splash
 - "Blogs" aka: Write-arounds
 - Entry/Exit Tickets
 - Writing Breaks "Hurry up and write!"
-

Graphic Organizer

Bell Ringer
A recent survey from Mr. [redacted] class showed that of 90 students, 50 had a dog, 40 had a cat, and 20 had both. How can you determine the percent of students who have neither a dog or a cat?



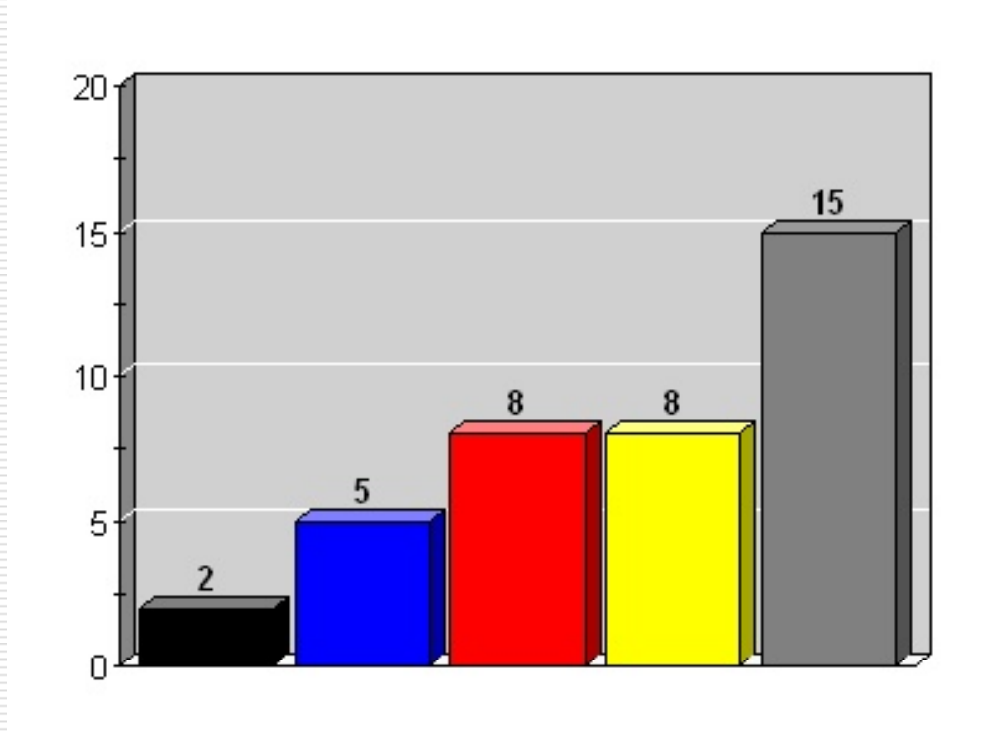
50 students have them
40 students have neither

First you would figure out how many students had either a cat or a dog, which is 50 students. Then you would figure out that percent, which is 40%. Then you figure out what out of 90 students, if 50 students had a dog or a cat, then 40 students don't have either, which would be 40%.

I disagree. All together with cats + dogs + both is 70 students out of 90. You have to divide 70 by 90 and that equals 77.7% of the students.

Open for Interpretation

Getting Students to Write

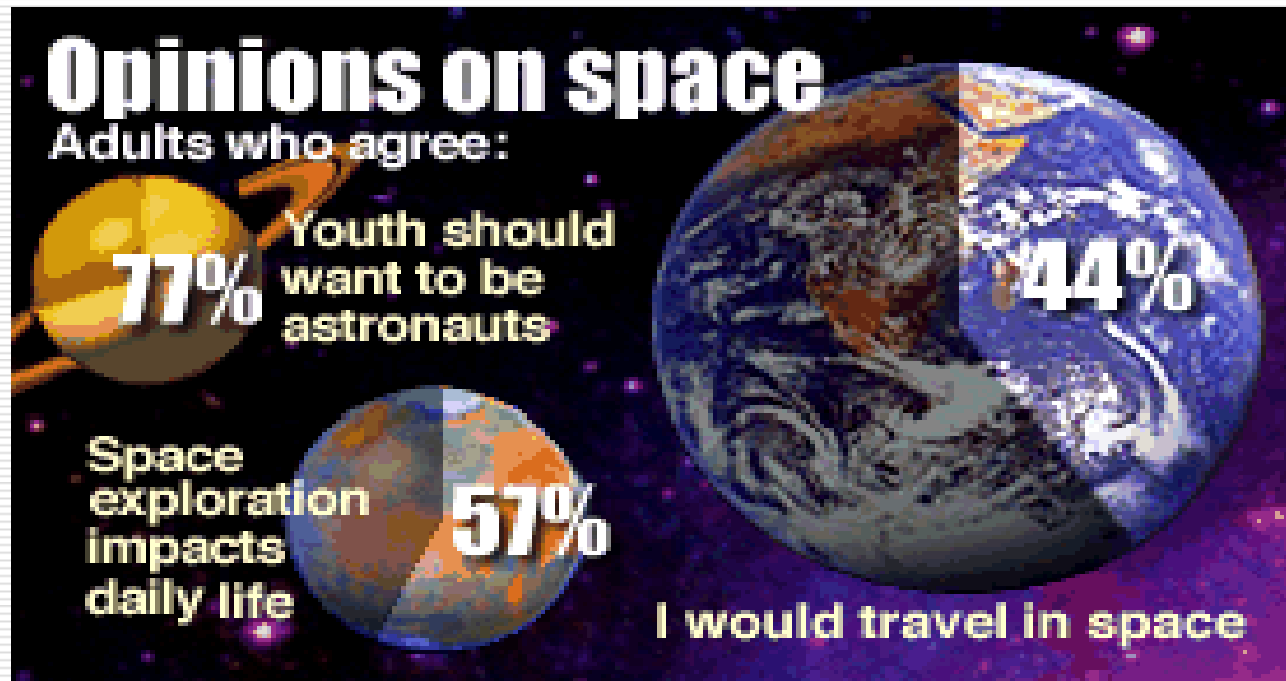


Write your interpretation about the information this graph is displaying

What do you think the message is?



What do you think about the opinions on space?

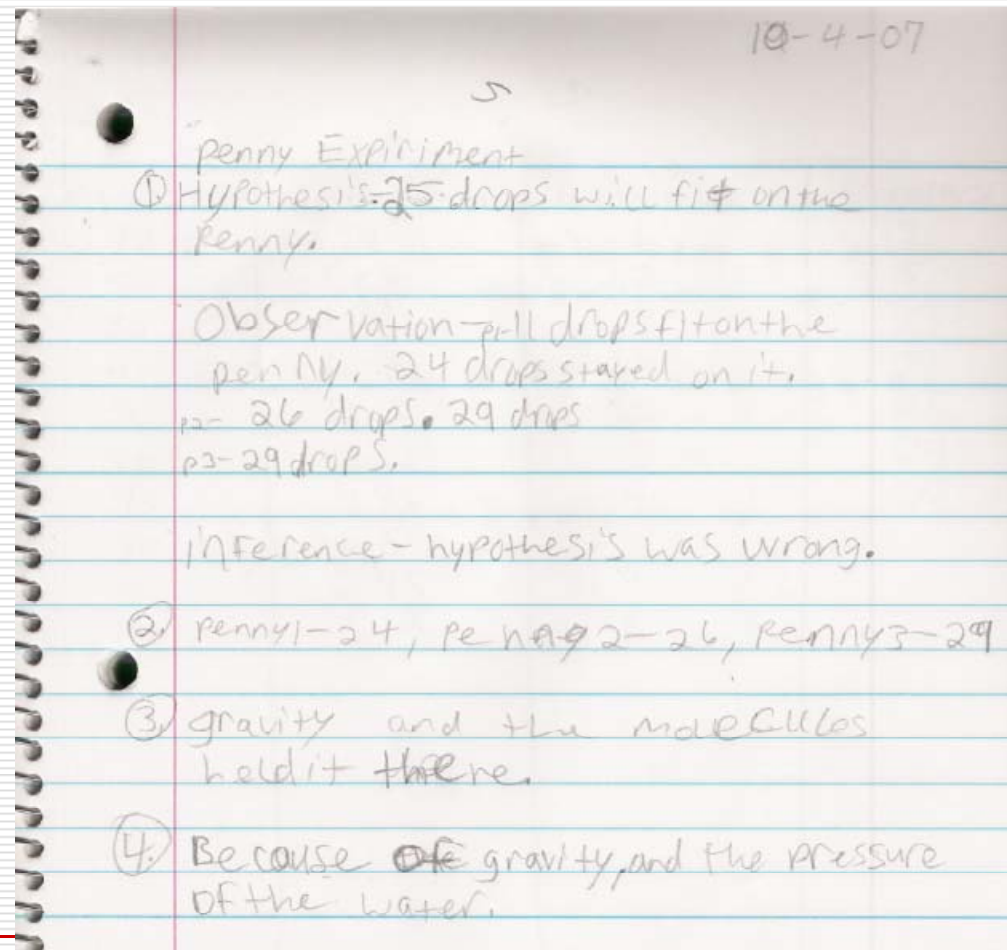


Word Splash

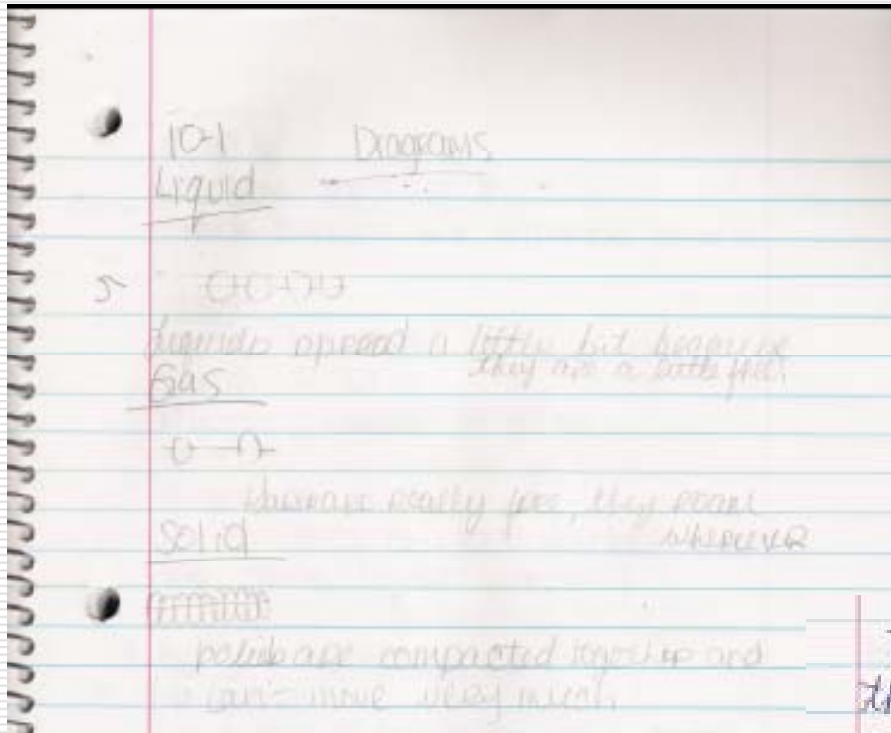
~ Ch. 6 Word Splash ~*

Word	Group Idea	Definition
Matter	Solid figures Size something that has mass takes up space	Any thing that - crystalline has mass and solids takes up space - amorphous solid
Solid	3D cube concrete cubes rocks	Matter that has a definite shape and a definite volume
Liquid	drink water H ₂ O solid	Matter that has <u>NO</u> definite shape but has a definite volume
viscosity	Vibration origin Velocity speed	Resistance to flow (clay and moves slowly)

Learning Log: Scientific Method Practice



Learning Log: Marshmallow Matter



They look the way they do because, their ^{molecules} ~~parts~~ are either compacted, a little free, or free. The solid are compacted, the liquid is a little free, and gases are really free.

Students Teach Each Other

Free Ribosomes
Wanted

Must be scattered throughout cytosol, Composed of 2 subunits,
and synthesize proteins that function within cytosol

24/7 no pay

Help wanted!

We need a cell organelle that produces
and stores protein or lipids
ATP
Endoplasmic Reticulum ATP!

Identifying Misconceptions

<p>The Mitten Problem</p>	
<p>B- The thermometer inside the mitten will have a higher temperature reading than the thermometer on the table.</p>	12/18/07
<p>I think the thermometer inside the mitten will have a higher temperature than the one on the table. I think this because the wool of a mitten will keep the heat inside. This will make the temperature rise as well as the reading of the thermometer</p>	

Class "Blog" aka: Write around

Space Explorer's Blog Sara S. Vasjos

What are the differences between comets + "planets" like Pluto?

Comets are icy chunks of ice and rock, and the planets are a whole place together with all different kinds of atmosphere.

Well planets are made up of gasses and rock and orbit the sun. But comets take a different way of the way they orbit, I think? And like that person who wrote in the pretty purple pen was right about the icy chunks of ice.

Yep. Comets are different. But from reading the thing yesterday I think Pluto + comets are pretty similar.

Writing for Understanding

Solar System

1/25/08

Sunny, partly cloudy, and cold
Galaxies

I learned that there is galaxies
are bigger than are milky way.

Galaxies are islands in space made of very
large numbers of stars, dust, and interstellar
gas. There are galaxies both larger and smaller
than the Milky Way. Galaxies vary in shape from
spheres to flattened disks irregular shapes
to perfect bars elliptical galaxies, and rings.

The Age and Size of the Universe

We are just beginning to discover that many
of the stars in our galaxy also have star
systems. If very old

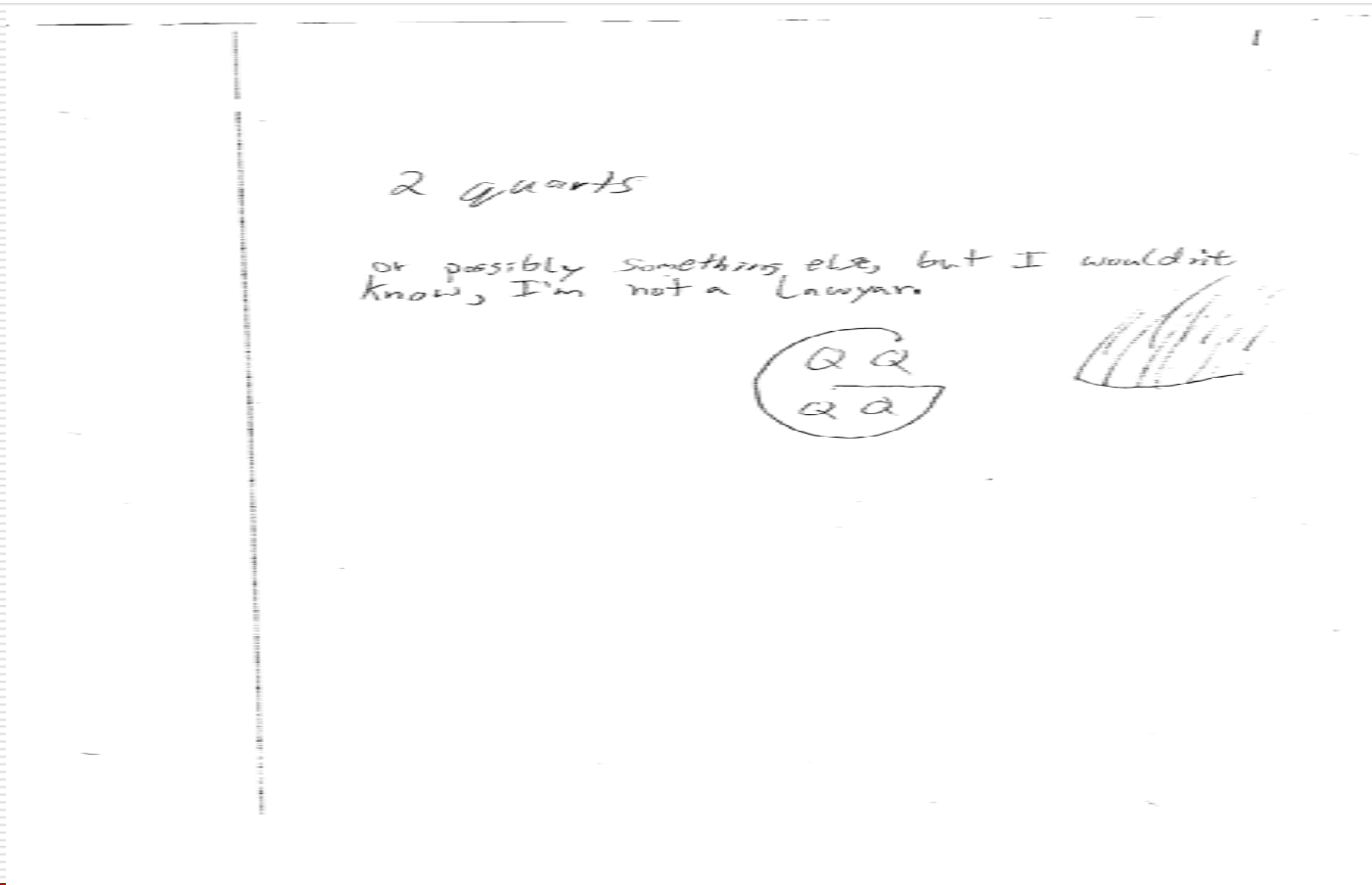
Results of Literacy-based Instruction

- Quality of student responses improves
 - Grammar skills improve
 - Student express themselves more effectively
 - Higher-level thinking in students more evident
 - Students more willing to share thought processes
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Comparison of Quiz Grades Before and After Anticipation Guides are Used

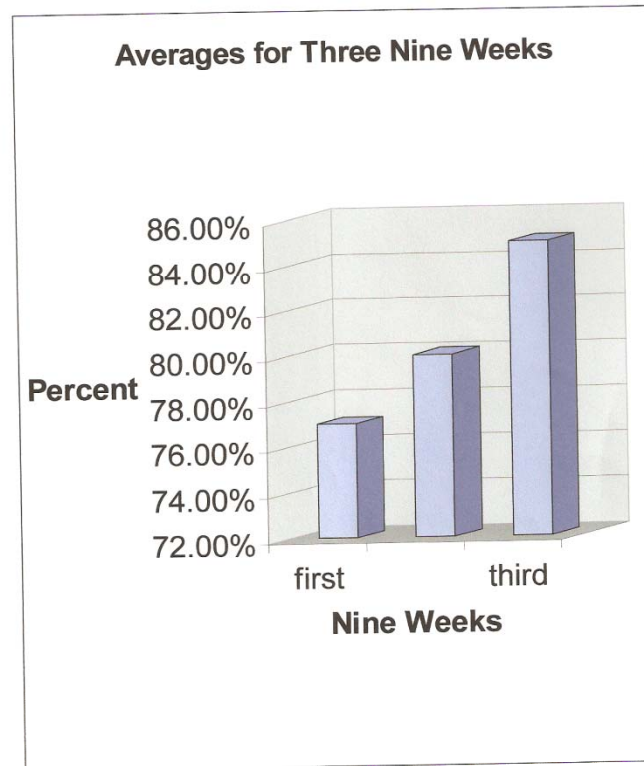
	Class Average		
Class Period	Quiz #1	Quiz #2	Quiz #3
1 st Period	72.7	58.1	74.1
2 nd Period	57.6	47.0	71.0
3 rd Period	68.9	47.5	81.2
5 th Period	77.1	75.2	90.8
6 th Period	64.0	63.2	73.0

Student Work Before Learning how to Write in Math Class



Student averages show improvement when incorporating literacy skills in math.

This graph represents all 5 classes.



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