

Interactive White Boards, Student Achievement and Engagement?

Final Report:
Evaluation Study of the Effects of
Promethean ActivClassroom on
Student Achievement

marzanoresearch.com

Phase I

Overall Effects

Uncorrected			Corrected		
ES	Percentile Gain	Fail-safe N	ES	Percentile Gain	Fail-safe N
.37 (N=85)	14	3,060	.44 (N=85)	17	3,655

Is this good?

Meta-Analysis of CSR Models

Borman et al, 2003. Review of Educational Research

- Looked at 1,100 studies

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- Average ES = .15; Gain = 6 percentile points

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- (As compared with ES = .44: Gain = 17 percentile points)

Meta-Analysis of CSR Models

Borman et al, 2003. Review of Educational Research

- Looked at 1,100 studies
- Average ES = .15; Gain = 6 percentile points
- Range: -2.13 to +7.83
- 35% of effect sizes were below zero

Effects for Length of Teaching (in years)

Uncorrected			Corrected		
Quartile Range	ES	Percentile Gain	Quartile Range	ES	Percentile Gain
2 to 5	.34 (N=16)	13	2 to 5	.42 (N=16)	16
6 to 9	.33 (N=18)	13	6 to 9	.39 (N=18)	15
10 to 15	.36 (N=22)	14	10 to 15	.44 (N=22)	17
16 to 32	.42 (N=15)	16	16 to 32	.51 (N=15)	20

Effects for Length of Technology Use (in Months)

Uncorrected			Corrected		
Quartile Range	ES	Percentile Gain	Quartile Range	ES	Percentile Gain
1 to 5	.27 (N=17)	11	1 to 5	.32 (N=17)	13
5 to 18	.31 (N=20)	12	5 to 18	.38 (N=20)	15
24 to 27	.43 (N=16)	17	24 to 27	.53 (N=16)	20
30 to 60	.42 (N=18)	16	30 to 60	.51 (N=18)	20

Effects for Percentage of Time Technology Used in the Classroom

Uncorrected			Corrected		
Quartile Range	ES	Percentile Gain	Quartile Range	ES	Percentile Gain
10 to 40	.09 (N=18)	4	10 to 40	.11 (N=18)	4
45 to 70	.40 (N=18)	16	45 to 70	.48 (N=18)	18
75 to 80	.67 (N=18)	25	75 to 80	.82 (N=18)	29
85 to 95	.18 (N=17)	7	85 to 95	.22 (N=17)	9

Effects for Confidence in Technology Use

Uncorrected			Corrected		
Scale Response	ES	Percentile Gain	Scale Response	ES	Percentile Gain
1	--	--	1	--	--
2	.18 (N=3)	7	2	.20 (N=3)	8
3	.33 (N=18)	13	3	.38 (N=18)	15
4	.33 (N=32)	13	4	.41 (N=32)	16
5	.48 (N=18)	18	5	.59 (N=18)	22

The “Sweet Spot”

- THESE 4 VARIABLES TAKEN TOGETHER:
 - An experienced teacher,
 - who has been using the technology for extended period of time,
 - who uses it about 75% of the time in class
 - who has had enough training to be confident in their use of the technology
- are significant at .05 level
- Average effect size for teachers in these categories was .90, Pgain = 32 points (some teachers had Pgain of 45+ points)

Taking the results of this study at face value for a teacher with this profile...

one would predict more than a 30 percentile gain in average student achievement

But you can't just give the technology to teachers and expect it to automatically enhance student achievement.

This is because 23% of the effect sizes were below 0.

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Phase II

Variables Analyzed

1. Engagement
2. Teacher IWB skill
3. Student IWB skill
4. Multiple student use of IWB
5. Student independent use of IWB
6. Use of IWB reinforcers
7. Use of voting
8. Nonlinguistic representation of content

Var	r uncor	r cor	Sig	Pgain (1)	Pgain (2)
Engage	.501	.504	.001	19	34
Teach IWB skill	.334	.338	.005	13	25
Stdnt IWB skill	.001	.006	NS	0	0
Mult use IWB	.421	.423	.001	16	30
Stnd ind use IWB	-.009	-.012	NS	0	0
IWB Reinforcers	.393	.395	.001	16	29
Voting	.321	.329	.005	13	25
Non-linguistic	.334	.334	.005	13	25

Var	r uncor	r cor	Sig	Pgain (1)	Pgain (2)
Teach IWB skill	.334	.338	.005	13	25
Student IWB skill	-.001	-.006	NS	0	0
Mult use IWB	.421	.423	.001	16	30
Student use IWB	-.009	-.012	NS	0	0

Var	r uncor	r cor	Sig	Pgain (1)	Pgain (2)
Engage	.501	.504	.001	19	34

- Games
- Inconsequential competition
- Manage questions and response rates
- Physical movement
- Humor
- Pacing
- Friendly controversy
- Opportunities for students to talk about themselves
- Unusual information
- Immediate feedback

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Reinforcers

- Drag and drop
- Hidden content
- Virtual applause

Reinforcers

- Make sure the focus is on the content
- Make sure the content is important to the learning goal

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Response Rate

Response Rate

- Wait time
- Think-pair-share
- Vote with your hands
- Vote with your feet
- Individual white boards
- Voting technology
- Type in responses

Var	r uncor	r cor	Sig	Pgain (1)	Pgain (2)
Non-linguistic	.334	.334	.005	13	25



Special Topic

Nonlinguistic Representations

Classroom technology can enhance...

- There are so many visuals built into IWB software and it is so easy to pull in online resources that illustrate key points
- The visuals are compelling and the color and variety can enhance students retention

Learning Goal: Understand how the systems of the body work, and work together . Focus: Digestive System

Your Digestive System and How It Works

On this page:

- [Why is digestion important?](#)
- [How is food digested?](#)
- [How is the digestive process controlled?](#)
- [For More Information](#)

The digestive system is made up of the digestive tract—a series of hollow organs joined in a long, twisting tube from the mouth to the anus—and other organs that help the body break down and absorb food (see figure).

Organs that make up the digestive tract are the mouth, esophagus, stomach, small intestine, large intestine—also called the colon—rectum, and anus. Inside these hollow organs is a lining called the mucosa. In the mouth, stomach, and small intestine, the mucosa contains tiny glands that produce juices to help digest food. The digestive tract also contains a layer of smooth muscle that helps break down food and move it along the tract.

Two "solid" digestive organs, the liver and the pancreas, produce digestive juices that reach the intestine through small tubes called ducts. The gallbladder stores the liver's digestive juices until they are needed in the intestine. Parts of the nervous and circulatory systems also play major roles in the digestive system.

Why is digestion important?

When you eat foods—such as bread, meat, and vegetables—they are not in a form that the body can use as nourishment. Food and drink must be changed into smaller molecules of nutrients before they can be absorbed into the blood and carried to cells throughout the body. Digestion is the process by which food and drink are broken down into their smallest parts so the

<http://www.ck12.org/health/why-is-digestion-important/>

<http://www.ck12.org/health/how-is-food-digested/>

<http://www.ck12.org/health/how-is-the-digestive-process-controlled/>

Digestive System

FEED THE SYSTEM
Not All Food is Treated Equally
 The digestive system has different mechanisms for breaking down different types of foods.

Select a food to watch the digestive system in action.

<http://science.nationalgeographic.com/science/health-and-human-body/human-body/digestive-system/article.html>

Internet

<http://science.nationalgeographic.com/science/health-and-human-body/human-body/lungs-article.html>

Lungs

The Breath of Life
 Our lungs are, essentially, a network of connected tubes that bring oxygen from the air into our blood, nourishing the trillions of cells that make up our bodies. The lungs also clean the blood of carbon dioxide waste created when cells use oxygen. We breathe in and out some 22,000 times per day, processing about 300 cubic feet (8.5 cubic meters) of air.

Next: Lung Anatomy >

INTERACTIVE FEATURE
Effects of Asthma

Brain POP

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Multimedia Learning
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People learn better from words and pictures than from words alone.

However,



Multimedia Learning
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Foster generative processing

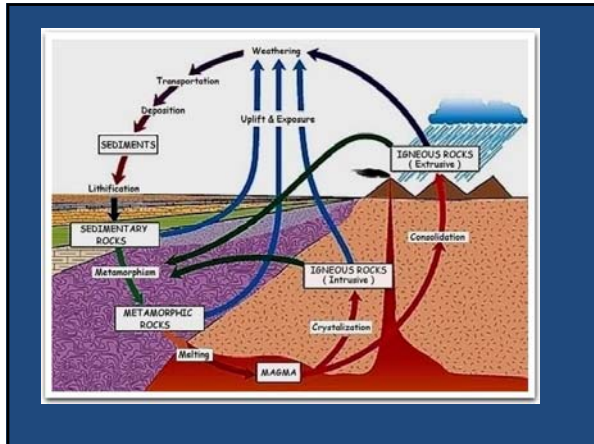
- Help students process content by using both words and images to make sense of the material.
- Must carefully select, organize, and integrate words and images.



Multimedia Learning
Richard E. Mayer

Reduce extraneous cognitive processing.

- Get rid of sounds, graphics, and words that distract from the essential information and that do not contribute to meaning.



ENERGY IN AN ECOSYSTEM

VOCABULARY

Consumer: an organism in a community that must eat to get the energy it needs.

- Carnivore:** animal that eats other animals for food.
- Herbivore:** an animal that eats plants for food.
- Omnivore:** animal that eats plants and other animals.

Producer: An organism that makes its own food.

Decomposer: consumer that breaks down the tissues of dead organism.

Worm, Fungus

Rock Type #3: METAMORPHIC ROCKS

Metamorphic Rocks are rocks that have been "changed" by heat and pressure to form a *new* rock.

Limestone

Will this scale weigh me?

Scale

Click on the red box to find the definition.

Here is an example of a scale on a map. (pull words to the right to reveal a picture)

Bonus Activity!
On the map, according to the scale, how many miles is Kabul from Zaranj?

Back to Menu

Will this scale weigh me?

Scale

The proportional relationship between a linear measurement on a map and the distance it represents on the Earth's surface.

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Back to Menu

History of the Holiday

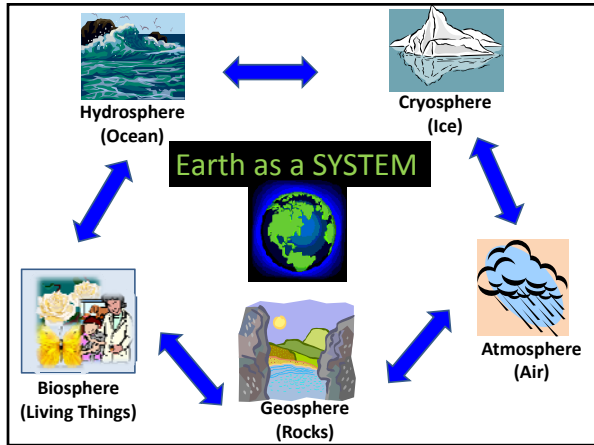
It took 15 years to create the federal Martin Luther King, Jr., holiday. Congressman John Conyers, Democrat from Michigan, first introduced legislation for a commemorative holiday four days after King was assassinated in 1968. After the bill became stalled, petitions endorsing the holiday containing six million names were submitted to Congress.

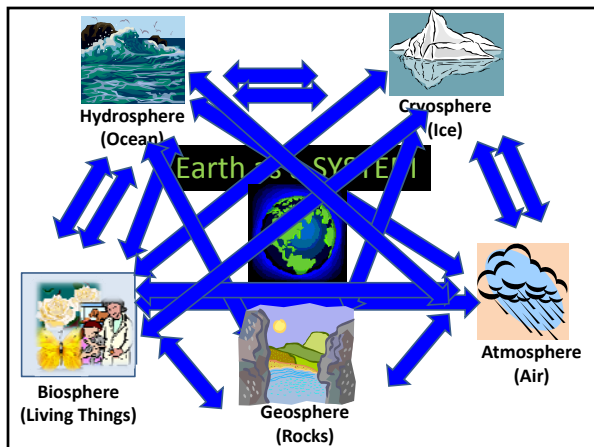
Conyers and Rep. Shirley Chisholm, Democrat of New York, resubmitted King holiday legislation each subsequent legislative session. Public pressure for the holiday mounted during the 1982 and 1983 civil rights marches in Washington.

Congress passed the holiday legislation in 1983, which was then signed into law by President Ronald Reagan. A compromise moving the holiday from Jan. 15, King's birthday, which was considered too close to Christmas and New Year's, to the third Monday in January helped overcome opposition to the law.

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- Place key words next to the relevant graphic.

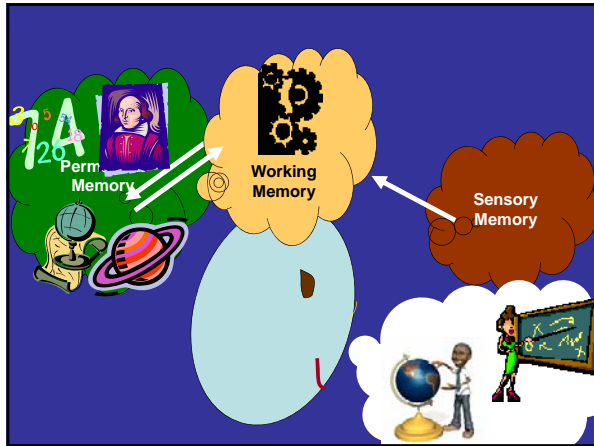


Multimedia Learning
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- Place key words next to the relevant graphic.
- Use graphics and narration rather than graphics, narration, and printed text.

What does engagement look like?



- ### Variables Analyzed
9. Previewing/reviewing content
 10. Chunking content
 11. Scaffolding content
 12. Pacing
 13. Monitoring student progress
 14. Clarity of content on IWB
 15. Students interacting about content
 16. Response rate
 17. Management

Var	r uncor	r cor	Sig	Pgain (1)	Pgain (2)
Preview/Review	.283	.284	.05	11	21
Chunking	.794	.791	.001	29	44
Scaffolding	.715	.715	.001	26	43
Pacing	.720	.716	.001	26	43
Monitoring	.726	.726	.001	27	43
Clarity of IWB	.646	.641	.001	24	40
Students Interacting	.352	.357	.005	14	26
Response Rate	.670	.672	.001	25	41
Management	.348	.350	.005	14	26

Critical Instructional Sequence

- Previewing
- Chunking
- Scaffolding
- Pacing
- Students interacting with content
- Monitoring understanding and providing feedback
- Reflecting and summarizing

Instructional Strat	IWB +	IWB-
Previewing	Well structured flip charts	Visuals that don't have a clear relationship to the preview

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Pacing	Teacher uses flip charts as a cue for pacing	Flip charts are good but teacher moves too quickly or too slowly
Interacting with content	Teaches uses voting technology and interacts with students about their responses (correct/incorrect, sure/unsure, added info)—reinforcers are used	Teacher doesn't use voting technology or teacher uses voting technology but doesn't interact about responses

Did you know....

Geosphere (Rocks and Minerals)

- Atoms form elements...
- ...elements form minerals...
- ...minerals form rocks!!!!

The diagram illustrates the process of rock formation. It starts with several individual atoms (represented as small blue and green circles) on the left. An arrow points to the word "Elements". From "Elements", an arrow points to "Minerals", which are shown as larger, multi-colored geometric shapes. A final arrow points to "Rocks", depicted as a cluster of these mineral shapes. A blue box with the word "Rocks" is positioned below the final cluster.

What's a geologist's favorite type of music?

Rock!

Did you know....

Geosphere (Rocks and Minerals)

All rock (except for meteorites!) that is on Earth today is made of the **same stuff** as the rocks that dinosaurs and other ancient life forms walked, crawled or swam over.

While the stuff that rocks are made from stays the same, the rocks do not. Over millions of years, rocks are recycled into other rocks.



What did the sedimentary rock tell his teacher during the test to become a metamorphic rock?

“This is too much pressure!”



Did you know....

Deck the halls with boughs of..minerals?

- Holidays lights are made from minerals



Did you know....



- The colors in fireworks are from...minerals.



Did you know....

- Igneous rocks make up around 90% of Earth's upper crust (top layer).
- Sedimentary rocks make up about 70% of the Earth's surface.



Did you know....

• Every person in the United States will use more than a million pounds of **rocks, minerals, and metals** during their lifetime





What did the metamorphic rock say to the igneous rock?

Don't take me for granted (granite) because I am nice (gneiss)!



Geosphere
(Rocks and Minerals)

Did you know....

- Gary Dahl became a multimillionaire when he invented one of the biggest fads of the 1970s--the "pet rock."





What does a rock want to be when it grows up?

A Rock Star!!!



Geosphere
(Rocks and Minerals)

Did you know....

- Rocks can be the size of your thumb nail or the size of a mountain.





Where do rocks like to spend their summers?

Pebble Beach!!!!

ROCKS

Three Types of Rocks based on HOW THEY ARE FORMED



Igneous



Sedimentary



Metamorphic
