A strategy for revealing student preconceptions about geologic topics

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Acknowledgments

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“How People Learn provides a broad overview of research on learners and learning and on teachers and teaching. The book focuses on three key findings.”
Key Finding #1

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**White Boarding** is a classroom strategy that is used to reveal student thinking
White Boarding Process

1) Organize the classroom into groups of 3 to 4
2) Present a question about a concept or process
3) Have students write down their thinking
4) Allow each group about 10 minutes to discuss their thinking about the process
White Boarding Process

5) Encourage the sharing of their ideas—no idea is right or wrong

6) Have the students sketch their thinking on a white board

7) Each group presents their thinking to the class via the white board
Watershed Hydrology

Middle Fork Nooksack River
Example

Introduction to infiltration/runoff
Warm-Up Question

1) Make observations about the three cylinders.
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- wet silt
- moist sand
- dry sand
2) Predict what will happen when the stopper is removed and 100 cc of water is poured into the each cylinder
- finer grains
- totally saturated
- partly wet sand
- wicking up
- dry sand

Predictions:
- Little bit of water will drip out
- Slower flow than dry sand
- Water will flow right through
Dry Sand

Wet Sand

Wet Silt

Same size grains, same amount and rate of output

Finer grains smaller amount of output because of a slower rate
wet silt

smaller grain size slows the flow

wet sand

Most sand initially wet so all would flow through

dry sand

dry sand will hold water

Predictions:
- little out slow
- most out fastest
- least out slowest
Most Discharge $\rightarrow$ #3

Middle $\rightarrow$ #2

Least Discharge $\rightarrow$ #1

(over time)

saturated silty clay
dry sand
wet sand
Student Response Summary

Most everyone predicted that less water would flow through the silt.

All them thought water would come out of the both of the sand-filled columns.

Some thought the dry sand would soak up and hold the water (like a sand castle).
My Observations

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Students engaged
water is flowing in fast

nothing happening
water is coming out

water flowing in slowly

water is coming out
nothing came out
soil storage

nothing came out
The Process Established my Topic Outline

What controls infiltration rate and runoff?

1) soil storage
   - initial soil-water content
   - soil thickness

2) percolation rate
   - hydraulic conductivity
Question

1) Which beaker evaporates more water and why?
Question

1) What factors control the timing and magnitude of streamflow?
Outcomes

The white-boarding process allowed me to:

➢ reveal student pre-conceptions about processes
Outcomes

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- reveal student pre-conceptions about processes
- outline a topic with experiential images in their minds
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Did it improve learning ?????
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Become loss tolerant to using jargon words

Did it improve learning ?????