## A *Few* Good Ideas: Integrating Earth Science with Physical Science and Life Science

47th Meeting GSA North-Central Section Kalamazoo, MI Thursday, May 2, 2013

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# OR

# A few big ideas?

Matter can change,	When matter and	Energy can change,
but the same atoms	energy interact,	but the same amount
still exist.	both are changed.	of energy still exists.

## Three problems with Conservation

#### 1) Atoms can be created.

No longer mine since factories can make everything.

- Atoms can be destroyed (2 ways)
  Need to recycle since we're running out of aluminum.
  Coal turns into heat and electrical energy.
- 3) Energy can be destroyed Need renewable energy since running out of energy















#### True Love, but keep separate bank accounts!

#### Changing Matter into Energy



#### **Destroying Atoms and Energy**



## Creating Atoms





Earth's resources are infinite and should be used to the fullest to increase the human standard of living.

#### 95% disagree

"Earth's resources are not infinite. The atoms are forever but the molecules that they're in are not."

"Even though matter is forever it doesn't mean all matter we have is readily available. If we don't recycle it takes a lot of energy to dig those materials back up again. Doing this digging can also cause damaging effects such as global warming." The amount of energy I use does not affect the environment to any significant degree.

85% disagree

"Whenever I turn on my electrical devices it causes more chemical reactions which causes carbon dioxide to be released into the atmosphere."

"We need to realize that the sum of our actions really does affect the earth so we need to be more conscious of our actions."

# Why Recycle?



## Why Turn off Electrical Devices?



## What motivates behavior change?



1=Not at all; 5=Really Motivating

## In personal life . . .

"I will always think about ways I can use less fuel so I don't burn gasoline and create more CO2."

"I am more observational and I think about things in everyday life at a molecular level."

" All energy ends up as heat energy. This will make me more conscious of my actions and how they impact our world. "

## For Future Teaching

"Reminds me to be a careful, conscientious consumer by recycling, carpooling, . . something I will pass on to my students."

"In order to scaffold understanding for more complex areas of science it is important for them to know this."

"...it is vital to build deeper understanding."

"This is the foundation of everything in science. Once I learned this I saw it come up in all the other areas."

### For using precise language . . .

I now know not to say atoms are <u>"lost"</u> or <u>"destroyed"</u> or that energy <u>"goes away"</u>. This is really helpful in understanding recycling & the use of Earth's resources."

## As an integrative tool . . .

"I now am capable of explaining to my students how atoms combine together to create all sorts of molecules that affect/interact with all four of the spheres."

"This allows me to realize that atoms that make up my food, clothes, and house used to be in other molecules and are going to end up somewhere else when my clothes get destroyed or I eat my food.



## NSF CCLI (DUE 0941820)