Correcting Misconceptions in Geologic Time
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Research Question
Is the workshop setting appropriate for targeting and correcting geologic time misconceptions?

Introduction
Most college students have scientific misconceptions which have formed from prior classroom instruction, personal experiences and/or inaccurate media. The field of Earth Sciences is based upon abstract concepts that cannot be easily, or at all, observed by humans, which can cause students to misunderstand geological information. On aspect of geosciences that has particularly high rates of alternate conceptions is geologic time.

Reasons for confusion in geologic time
- Human time scale is too short to observe concepts of geologic time
- Pre-college courses & popular media focus on the most recent time periods, and largely ignore the first 4 billion years of Earth’s history
- The Earth has undergone drastic changes since its formation which are hard to conceptualize
- Religious beliefs contradict concepts of geologic time

Purpose
According to Julie Libarkin, Professor of Geosciences at the University of Ohio:
“alternative conceptions held by students, particularly college students, are not well documented or understood” in Earth sciences

Most students hold geological misconceptions however most educators do not know the topics or extent of the misconceptions.
“Experienced faculty often have a difficult time believing the alternative conceptions held by college students”

Understanding the prior knowledge students have before taking a geology course can help professors change their teaching styles to target and correct students misconceptions.

Results & Conclusions
- Students had a less than moderate understanding in Survey 1 and a moderate-high understanding in Survey 2 and 3
- Pre-quizzes can be used to identify misconceptions
- Workshops are an effective setting for targeting and correcting misconceptions

Method
Misconceptions were identified using a survey developed by Libarkin.

Students took the same survey three times:
Survey 1: Taken before exposed to geologic time material
Survey 2: Taken two hours after receiving a 10 minute lesson from workshop leader
Survey 3: Taken a week after the lesson.

The responses were evaluated on a scale of 0-1,
0= weak understanding,
0.5= moderate understanding,
1= strong understanding.

Survey questions and evaluation rubric

Question #1
“If you had a time machine and could travel back to when the Earth was formed: What do you think the Earth would look like?”

Strong: gas, magma, unsuitable for life, no atmosphere
Moderate: microorganisms, prokaryotes, eukaryotes, bacteria, etc.
Weak: plants, animals, dinosaurs, aliens, biblical references, no response

Question #2
“How many years back in time would you have traveled?”

Strong: 4-5 billion
Moderate: correct unit of billion
Weak: anything else, no response

Question #3
“Would there be any living things? If so, which organisms do you think you might encounter?”

Strong: none
Moderate: microorganisms, prokaryotes, eukaryotes, bacteria, etc.
Weak: plants, animals, dinosaurs, aliens, biblical references, no response

Question #4
“The line below represents the time from when the Earth formed to today. Please mark on the timeline when first life, dinosaurs and humans appeared.”

Strong: Humans at far right end, dinosaurs in last 1/4; first life in the first 1/3
Moderate: Humans in last 1/4; dinosaurs in last 1/3; first life in first 1/2
Weak: anything else, no response