

# Beyond the Collection Box



## Using Natural History Collections in Promoting Transformative Pathways in K-12 STEM Learning

Anne Basham, M.Phil/Ed.D, Education/Outreach

Arizona State University BioKIC (Biodiversity Knowledge Integration Center)

## For K-12 teachers what things are going to be important for adoption in the classroom?

- Integration with Common Core State Standards or NGSS (National Generation Science Standards).
- Integration with current STEM curricula and lesson plans.
- Time.
- Want something to engage, motivate, and prompt critical thinking.
- Desire programs that go beyond teaching to the test. Important to many teachers to provide opportunities for learning enrichment.
- So--what can we tell teachers about the benefits of collections in the K-12 classroom?

# How might objects promote transformative learning?

Transformative learning results when. . .

- One forms new ways of viewing and defining their world based on reflective engagement with new knowledge or objects.
- Transformative learning is about meaning making. (Dirkx, and Constructivist theorists)
- Transformation may be so radical that it can result in social change or change in policy. (Freire)

# Barriers to Transformative learning

- Political, social, economical, and environmental can create barriers to learning.
- Standards and testing policies.
- Lack of accessibility to learning resources and cognitive enriched environments often found in areas of poverty.
- Language barriers.
- Technology barriers.
- Basic necessities of life as seen with homeless children.

# Is an object in itself intrinsically meaningful and transformative?

- Are objects meaningful only when they appear within a contextual framework?
- Meaningful without prior knowledge and experiences to connect with the object?
- Can objects alone serve as a mediator between the concrete and the abstract?

Reuben Feuerstein a cognitive psychologist states that objects and nature cannot intrinsically mediate, only people can.





Paulo Freire states, "People teach each other, mediated by the world. . .or by cognizable objects. . ."



The following are ten types of identified benefits and characteristics of natural history objects in a classroom.





# 1. Objects can promote shared meaning and experience.



- Familiar objects prompt shared meaning, narratives, and prior knowledge.

2. With some objects the student may have no point of reference or prior knowledge to form meaning.



This is not necessarily a bad thing.



Objects prompt dialogue and reflection when it is not apparent what an object might be.

-Interpretive dialogue---I think it looks like. . .

-In essence this is science in its most fundamental form. Like a scientist discovering a new species, students go through the process of scientific inquiry.

### 3. Objects prompt scientific inquiry and critical thinking.



- The act of critical thinking in itself promotes transformative learning in that it encourages students to ask questions and to challenge the status quo. Ask them how they did come up with their conclusions?

## 4. One object. . .many stories and worldviews

- The following student was a refugee from a region in Burma that was in a state of war and oppression with a scarcity of food. This was on a subject of biodiversity which held different meanings for some students.
  - Student: (Burmese) We don't have any animals in our country.
  - Teacher: No animals?
  - Student: Everybody eats the animals.
  - Class: Do you eat dogs?
  - Student: Yes, we eat.
  - Class: Monkeys?
  - Student: Yes, we eat.
  - Class: Snakes?
  - Student: Yes, we eat.
  - Class: Insects? Student: Yes, we eat everything



5. Objects when put into a contextual framework can promote transformative and meaningful learning.



- Meaning is gained when an object is put into some kind of context.
- In this example students gained a greater understanding of the mammoth tooth when we took a field-trip to see a real mammoth at the Arizona Museum of Natural History.

6. Objects serve as mediators in connecting the abstract with the concrete.





## 7. Objects promote scientific communicators.



English Language learners create an exhibit and share with general public at the Arizona Museum of Natural History.



## 8. Specimens can inspire STEAM and object makers.





9. Object-based pedagogy important across the lifespan and can be foundation for intergenerational programs.







## 10. Do objects need to be physical objects to be transformative?

New research and questions arise. . .

- What differences in learning impact and outcomes are there between virtual over physical objects?
- What role and impact might new immersive technologies have in the classroom?



## 9. What's the difference?

### VIRTUAL OBJECTS

- Cloud-based curation.
- Linked with database.
- Tangible via a tool such as an AR card.
- Can place a disconnected object within a contextual framework and the printed page.
- Accessibility dependent on user understanding use of technology and app design. Can promote visual literacy and engagement with objects in space and place.
- Accessibility to specimens limited to what is featured in a digital repository.

### PHYSICAL OBJECTS

- Physical storage and curation.
- Linked with database-but not always easily accessed.
- Limits to being able to manipulate directly.
- Requires a mediator or a physical exhibit to put object into a contextual framework.
- Accessibility dependent on exhibit design.
- Many objects can't leave the museum.
- Many objects remain in physical storage and are never viewed by public.

Are there target audiences in the K-12 classroom who would benefit most?

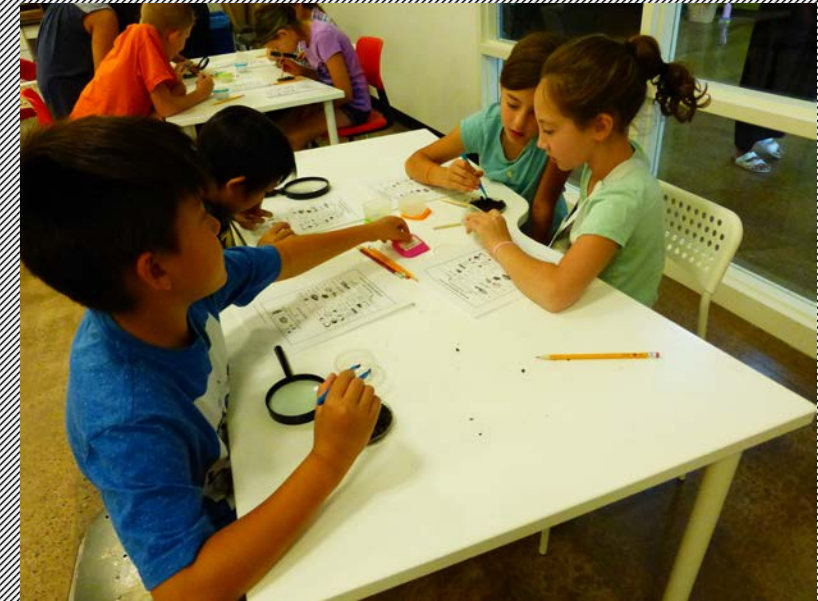


-English Language Learners--Collection objects connect abstract concepts with the concrete creating a powerful tool for English language learners and can be aligned with the ELP (English Language Proficiency Standards).

-Montessori classrooms

Already based on an Object-based pedagogy and a constructivist or "discovery" model where students learn concepts from working with materials, rather than by direct instruction.

-Special Needs students-Objects are sensory and tangible providing a pathway for students to connect with the abstract.





# In Review

- 1. Objects can promote shared meaning and experience.
- 2. Objects without a contextual framework. . . not necessarily a bad thing.
- 3. Objects prompt scientific inquiry and critical thinking.
- 4. One object. . . may have many stories and worldviews.
- 5. Engage students with the object. . . then put the object into context to further promote meaning.
- 6. Objects can serve as mediators in learning—connecting the abstract with the concrete.
- 7. Objects promote scientific communicators.
- 8. Objects inspire STEAM and object makers.
- 9. Objects across the lifespan.
- 10. Objects may not be just physical objects.



# Thank you!

More info:

Libraries of Life

[www.libraries-of-life.org](http://www.libraries-of-life.org)

Good Resource: University College London

<http://www.ucl.ac.uk/museums/learning-resources/object-based-learning>

English Language Standards (ELP)

[http://www.ccsso.org/Documents/Final%2030%20ELPA21%20Standards\(1\).pdf](http://www.ccsso.org/Documents/Final%2030%20ELPA21%20Standards(1).pdf)

