

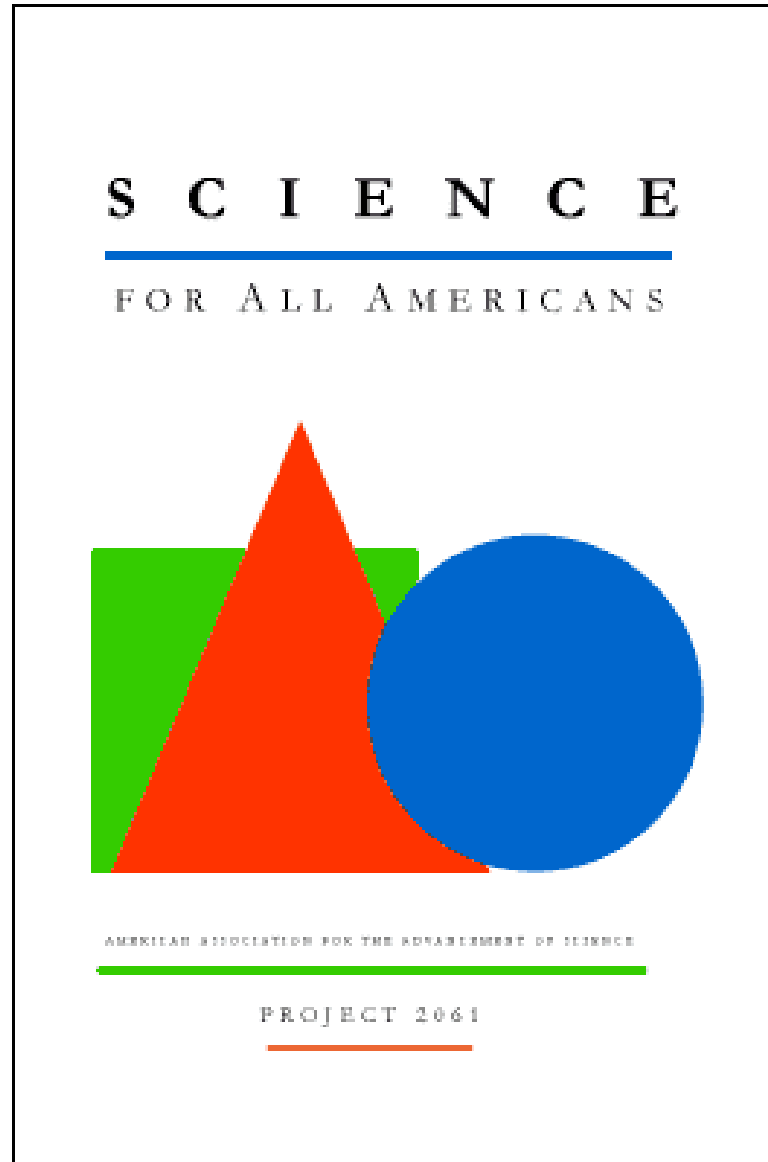
Nurturing Citizenship and Partnership thru Biology

Emily Weigel

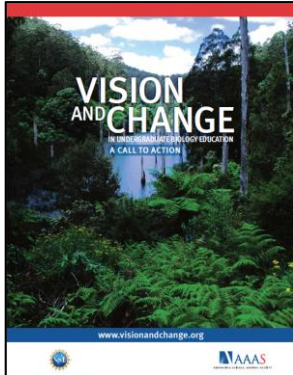
Biological Sciences at Georgia Tech

Science literacy for all Americans

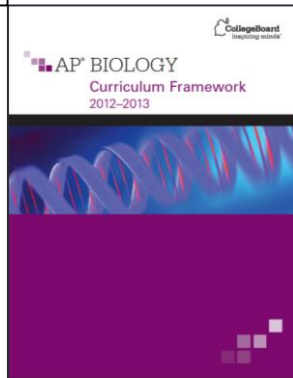
- Goal of science education in the US for the last (and next!) 50 years



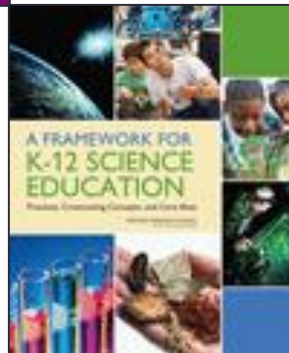
The reform of American science education



Vision and Change in
Undergraduate Biology (2011)



AP Biology
Curriculum Framework (2012)



Next Generation
Science Framework
(2012; Standards: 2013)

Less Content, More Practices

- Practices **integrated** with Content
- Main Practices highlighted:
 1. **Asking questions and defining problems**
 2. Developing and using models
 3. **Planning and carrying out investigations**
 4. **Analyzing and interpreting data**
 5. Using mathematics and computational thinking
 6. Constructing explanations and designing solutions
 7. Engaging in argument from evidence
 8. **Obtaining, evaluating, and communicating information**

ESA's Stance...



- Doherty, Ebert-May, and Pohlad (2010+)
 - Ecology Learning Framework
 - Biological Diversity,
 - Matter and Energy in Ecosystems,
 - Interactions within Ecosystems,
 - Impacts of Humans on Ecosystems,
 - Impacts of Ecosystems on Human Health and Well-being

Updates from DBER*

- 'Prescribed' --> Inquiry-based

(Windschitl et al 2008; Passmore 2009)

- Quantitative Ecology and Data Literacy
 - Using student-generated data
 - Using the 'real tools' of ecologists
 - Assuring students can interpret and discover meaning



TECH

Ecology Lab at Tech

Two Ecosystems

Terrestrial

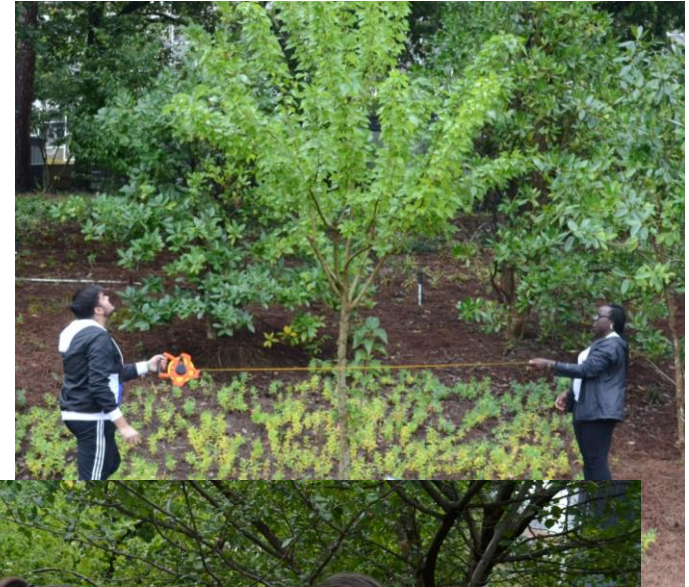


Aquatic



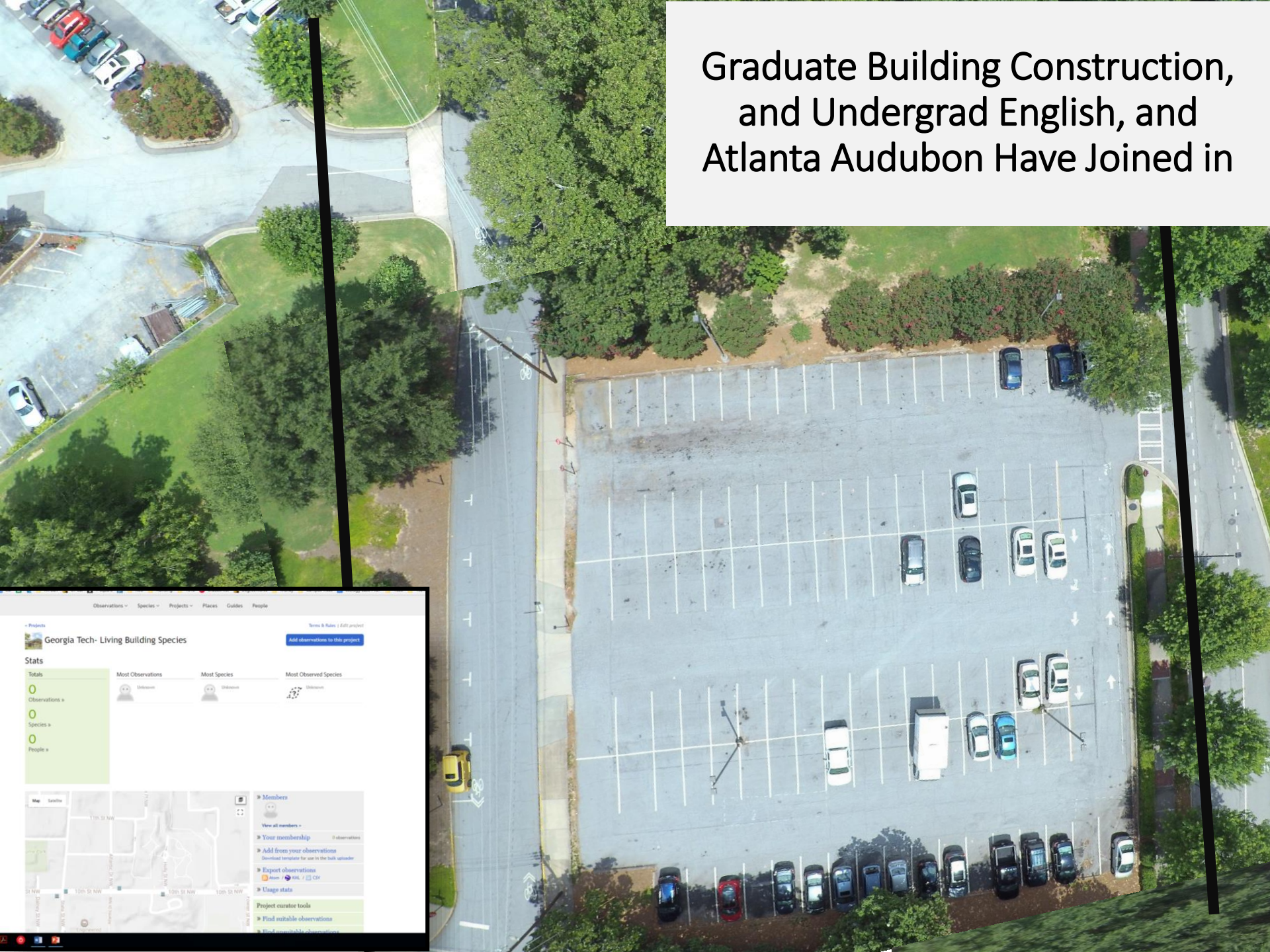
Terrestrial: Campus Ecology

- Impacting buildings and planting of trees
- Biodiversity and phenology surveys → data for other and future classes, *campus partners*
- Experience with long-term monitoring



Graduate Building Construction, and Undergrad English, and Atlanta Audubon Have Joined in

The screenshot shows the iNaturalist project page for "Georgia Tech- Living Building Species". The page includes a navigation bar with "Observations", "Species", "Projects", "Places", "Guides", and "People". Below the project name, there is a "Stats" section with three columns: "Totals", "Most Observations", and "Most Observed Species". The "Totals" column shows 0 observations, 0 species, and 0 people. The "Most Observations" and "Most Observed Species" columns show 0 observations and 0 species. There is also a "Members" section with options to "View all members", "Your membership", "Add from your observations", "Export observations", and "Usage stats". A map is visible in the bottom left corner.



Aquatic: Proctor Creek

- Working with several federal and local agencies and community members
- Biodiversity surveys of the area
- Linking into existing long-term monitoring



Advantages: more hands, more surveying (time and space), access to new funding/support sources, direct expert training of students, state-of-the-art sampling

Evidence of Impact

*“I learned a lot about **group work and cooperating** with others in order to **achieve a larger goal**. This was both literally (while we **collected data**) and figuratively (as we **exchanged ideas and questions about why** we may have observed what we did). It was also **interesting to learn** about the **local environment - historical and social** factors that affected the area - which I feel was necessary in order to **understand the significance of what we were doing**.”*

Evidence of Impact

Most Valuable Aspect:

- *“I got to leave the classroom and explore outdoors and do assignments that were actually aiding the environment and other people rather than just for a grade.”*
- *“Understanding the relationship between ecological, social, and economical factors. I personally had never thought about how the environment impacts its residents--I had always thought about it the other way around. But it's important to understand that that relationship is a two-way street.”*
- *“I think drawing our attention to ecosystems on or nearby Tech campus was a great way of teaching us to appreciate these places. I hope to become more involved in future conservation efforts as a result of what I've learned in this class.”*

So, I don't teach Ecology Lab. How can this help me?

Take stock and adapt

- What are you currently using in your courses?
- What resources/work exists for what you are planning to carry out?
- What partners might be interested in what you do, or conversely, *who might need you?*

Collaborate Off-Campus

- USFW, EPA, WAWA, CRK already collaborate; I asked, “how can we plug into that network?”
- Identify what unique resources you bring (often, it goes beyond energy and manpower)
- Be generous about expanding the network in which you work and the resources you can access

Collaborate on Campus

- Talk to people about what you are doing
- Show investment in the project by meeting people in their buildings or common spaces
- Take the time to understand and delineate roles in projects, as well as departmental opportunities and constraints around the projects

Look for novel connections

- Across courses and curricula
- Across levels (graduate and undergraduate training)
- Across types of projects and roles
- Ask, “What common resources do we use, and what common goals do we want for our students?”

Thanks!

Emily.Weigel@biosci.gatech.edu

Evidence of Impact

“I learned a lot about group work and cooperating with others in order to achieve a larger goal. This was both literally (while we collected data) and figuratively (as we exchanged ideas and questions about why we may have observed what we did). It was also interesting to learn about the local environment - historical and social factors that affected the area - which I feel was necessary in order to understand the significance of what we were doing.”

Evidence of Impact

Most Valuable Aspect:

- *“I learned how ecology can be used to not only improve the health of the environment, but also improve people's social and economic well-being.”*
- *“Ecology is an extremely applicable topic, so learning how our actions as citizens impact the land around us helped me to see areas I can improve in.”*
- *“I got to leave the classroom and explore outdoors and do assignments that were actually aiding the environment and other people rather than just for a grade.”*

Evidence of Impact

Most Valuable Aspect:

- *“Learning about existing resources and programs that I can be a part of to continue to serve the community and put to use SLS skills and values.”*
- *“It gave me a new way to think about the world around me in terms of ecology and sustainability.”*
- *“Understanding the relationship between ecological, social, and economical factors. I personally had never thought about how the environment impacts its residents--I had always thought about it the other way around. But it's important to understand that that relationship is a two-way street.”*
- *“I think drawing our attention to ecosystems on or nearby Tech campus was a great way of teaching us to appreciate these places. I hope to become more involved in future conservation efforts as a result of what I've learned in this class.”*

Evidence of Impact

- *“I learned better how the government works with the environment in big cities and now have a better idea of how to make my voice heard.”*
- *“The project was pretty open-ended, but I enjoyed that freedom. I wish we just had more time for the project so that we actually could have worked more with potential partners. Like it would have been neat if this was a semester long project or even at least half of the semester as opposed to the last two weeks of the course.”*