Remote active learning in botany using your students' homes and neighborhoods – an opportunity and a challenge

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"memorable, deep learning takes place when people are actively engaged, collaborating, and applying their learning to their daily lives"

Chickering and Gamson, 1987

How do students learn?

Listening to lecture, no notes – retains 10% information

Attention span – ca. 15 min for lectures (6 min for videos)

Class length? Rutgers University = 80 min.

Students often quit science because of the **pedagogy**, **not the topic**.

Too much memorization and exams, too little understanding and everyday-life relevance.

=> Active learning movement in teaching

Learn the most

- **Student teaches other student**
- Student practices learned knowledge
- Student discusses
- Demonstration by teacher
- Teacher shows video or visuals
- Student reads
- **Teacher gives lecture, faculty gives seminar**

Learn the least

Set Weather

nj.com True Jersey.

Subscribe

Coronavirus

Coronavirus: Updated list of N.J. colleges with canceled classes, plans to switch to online instruction (March 11)

Updated Mar 11, 2020; Posted Mar 11, 2020

Spring 2020 … Suddenly thrown in at the deep end of the online teaching pool…

Botany community response to COVID-19 pandemic Spring 2020:

BOTANY DEPOT

Shared materials and ideas for online curricula on **BotanyDepot**
Facebook group ***'Botany Education in the 21st century';*** twitter used for dissemination.

BSA created a website with many teaching resources. (see resource links at end)

And now, Fall 2020 – the pandemic rages on, time to plan for our online classes…

Rutgers will be mostly remote this fall. Here's what students, staff need to know.

Posted Jul 06, 2020

What happens to active learning when a class is moving online?

Remote ≠ Active Learning?

(cc) Lena Struwe

What is impossible when you are teaching 100% online?

NO Physical in-class activities

- Morphology bingo
- Weed walks
- Field Trips
- Toxic plant in the ER role play
- Etc.

(cc) Lena Struwe

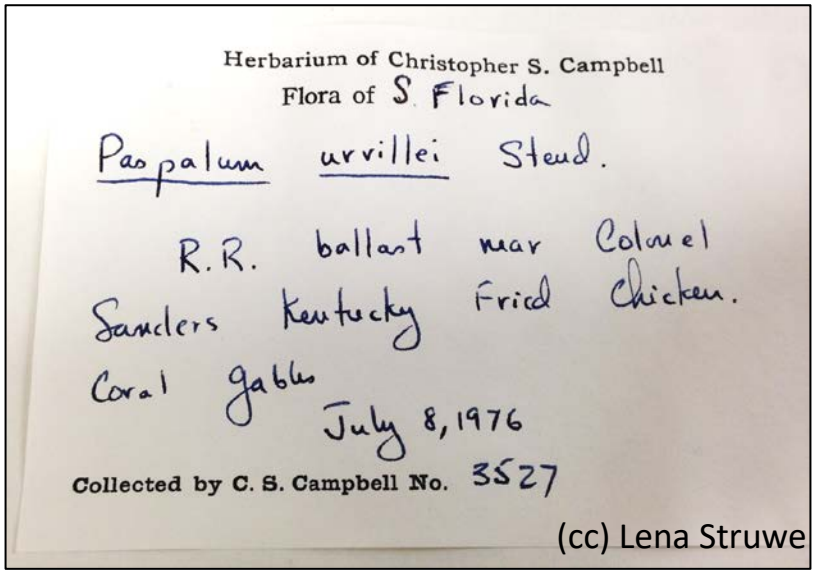
NO Labs with plant demonstrations of hundreds of species

Living materials, dead & dry, edible fruits to taste, microscope slides, and live dissections.
A microscope for each student.

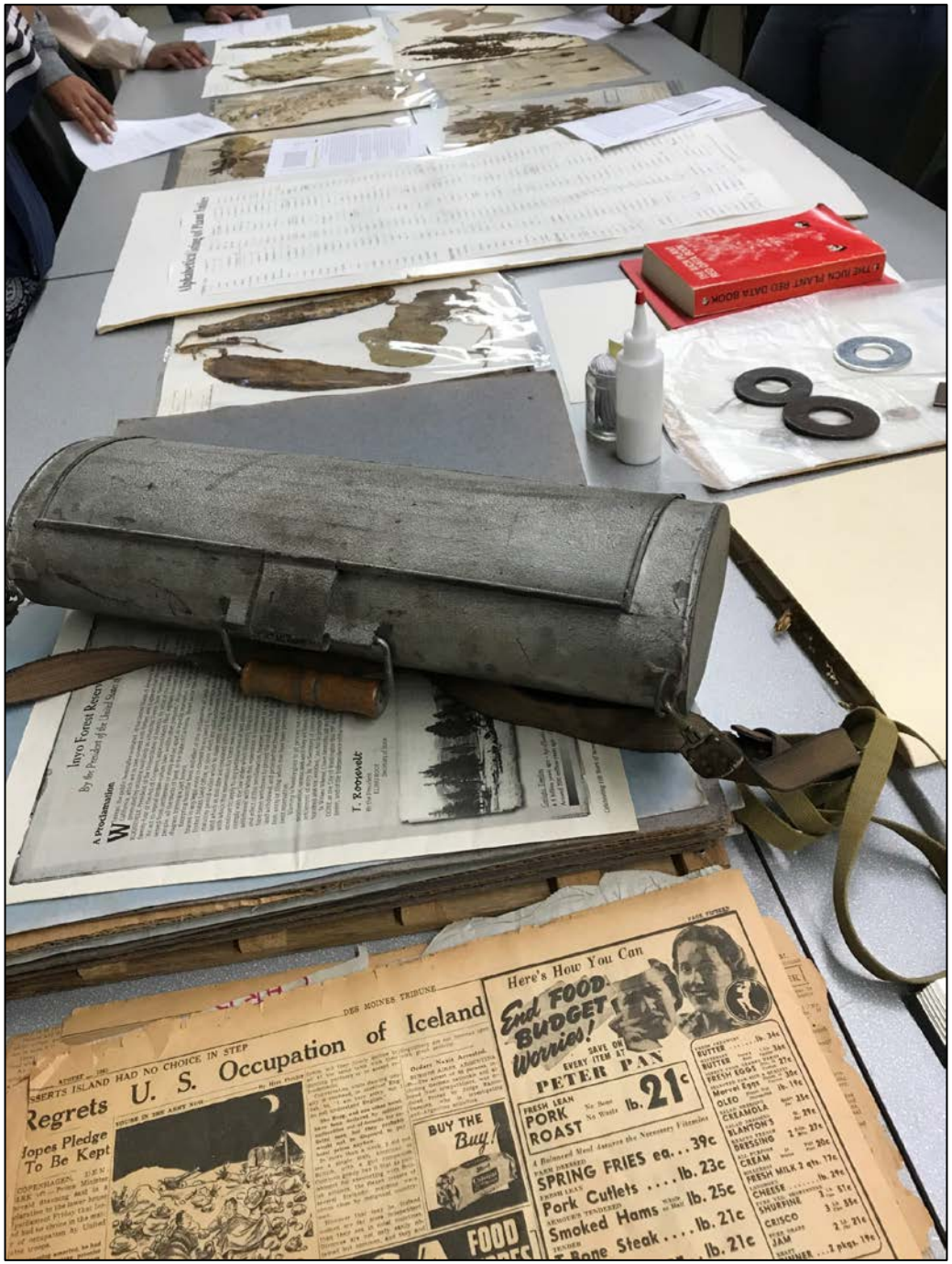
NO In-person discussions and demos

- Social communities
- Joint experiences

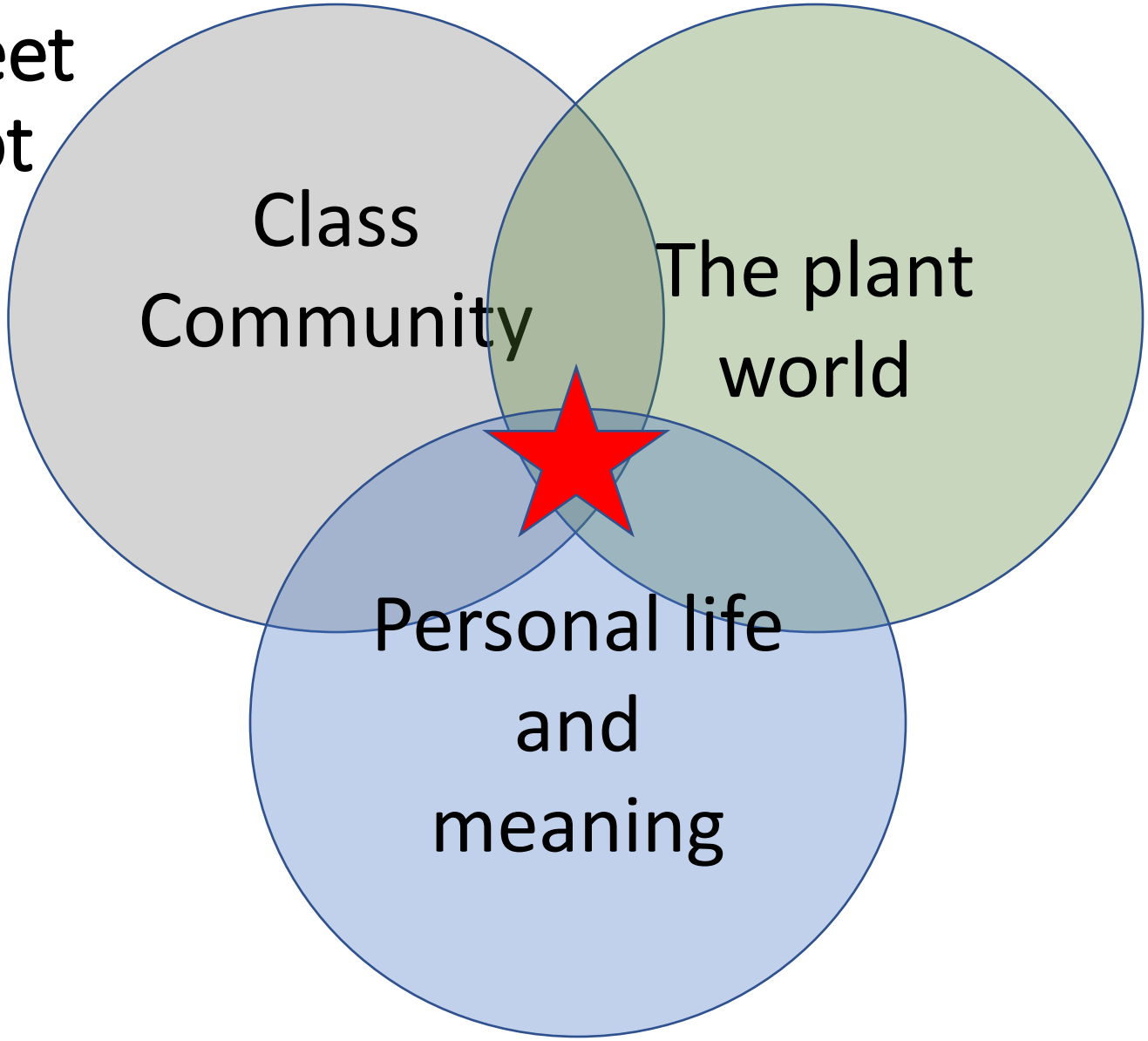
NO Herbarium visits



(cc) Lena Struwe



You still have to find the sweet learning spot for your students



Teaching Botany@Home

A new mindset.

Less prescriptive, more explorative.

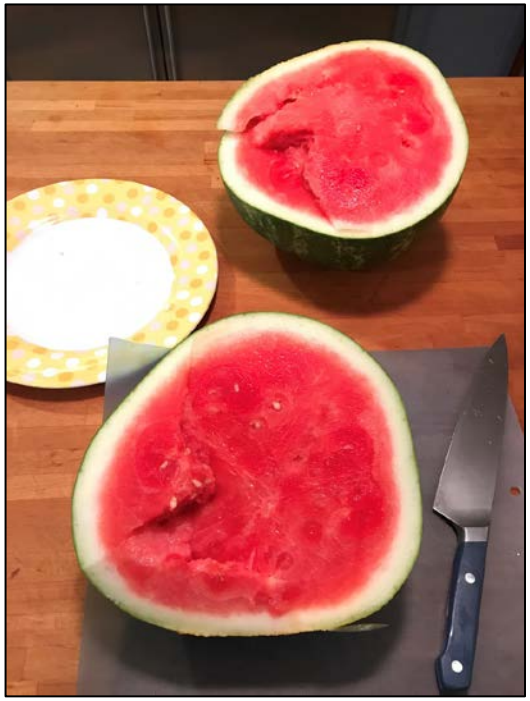
Less planned, more flexible.

A little scarier for the instructor.

Less or more relevant to student's lives?

Instead of lab materials – The everyday home flora is diverse

We are surrounded by common and often overlooked plant diversity resources such as parks and gardens, sidewalks and roadsides, supermarkets, kitchens, bathrooms, art, and windowsills.



Edibles Medicinal Images

Weeds Trees Spices Crops

Ornamentals Wildflowers

Create Cumulative Biodiversity Resources made by students (and you)

- Let students share and discuss what they explore.
- Create learning communities and joint online experiences

IMPORTANT!
Access, risk, and available biodiversity will not be equal for students

Resource and internet accessibility will depend on:

- *socioeconomic status*
- *geographic location*
- *season and climate*
- *each student's own risk assessment*
- *COVID-19 status (quarantine, illness, etc.)*

Your syllabus has to reflect this reality and you will need to provide solutions and backup plans for potential (unknown) situations.

Be nimble, flexible and understanding.

- *Don’t send a shopping list to students*
- *Assume they might be located anywhere in the world.*
- *Some might be afraid of going outside their front door*
- *Some might be afraid of certain situations and might not want to visit a park alone*
- *Some might be babysitting during class*
- *Assume you and they will have internet problems*

Aim to make everyone succeed by being able to do all assignments successfully whatever their reality looks like. These are **extraordinary** times. Keep expectations high and provide clear instructions and tools to succeed.

Create modules, structure, and set expectations early

- Synchronous or asynchronous?
- Don’t just copy your classroom class to online; modify and evaluate components.
- Modulize the content, shorter lectures, shorter assignments, arrange teamwork in advance, spread out deadlines.
- Be aware of the grading load. Use rubrics to ease and explain grading.
- Exams? (We do open book, timed.)
- Have at least weekly live Q&A and demo class times (don’t call them office hours).

Botany class foundation goals

- Give them a toolkit for field trips and home lab.
- Teach them the language of botany (terminology).
- Teach them how to take good plant photos.
- Teach them life-long curiosity by encouraging them to observe, think, question, compare, contrast, feel.
- Have clear botany-focused learning goals.

Student tool kit for Ecology and Evolution at Rutgers

- tiny ruler for scale on photos in the field
- laminated mm paper, double sided for photographic background with scale
- laminated tick and poison ivy ID card
- handlens, 10x
- tweezer for dissecting, stuck into cork
- scalpel, plastic, straight blade
- teasing needle (2), stuck into cork
- cm/inch tape measure, 150 cm
- 2 small plastic jar with screw-on lid
- 3 plastic snap cap vials (collection jar)
- tick key remover, fits in wallet
- Rite-in-the-Rain notebook (1)
- Rite-in-the-rain copy paper (20)
- plastic, waterproof clipboard (1)
- field thermometer
- plastic pipette dropper
- plastic petri dish with lid
- disposable gloves (2 sets)

Estimated cost $30 / student

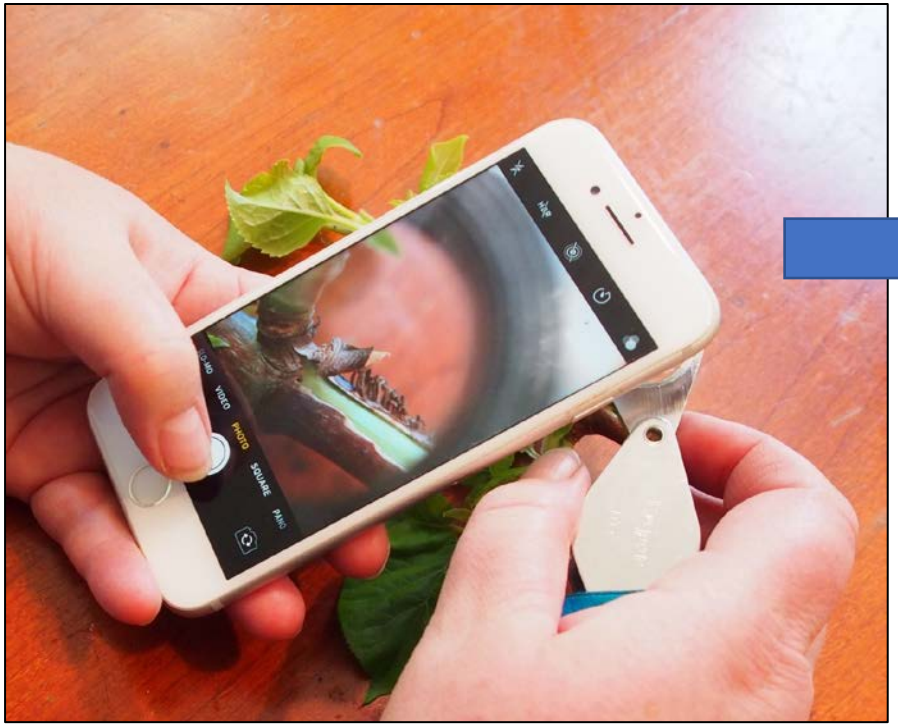
STUDENT AWARD at end of class: Voted Best creative box or bag for personal toolkit

Students select a *personal talisman / token / signature object* to be in their photos

(cc) Lena Struwe

Teach them smartphone plant photography

Hold the lens in front of your smart phone camera and then take a photo. Play with various distances between hand lens and phone camera – very short depth of field. Beware of shaky hands!



Photos (cc) Lena Struwe

Teach observation skills and nature journaling

DEVELOP SKILLS

❖Attention

❖Curiosity

❖Creativity

SUPPORT 3 COMMUNICATION WAYS

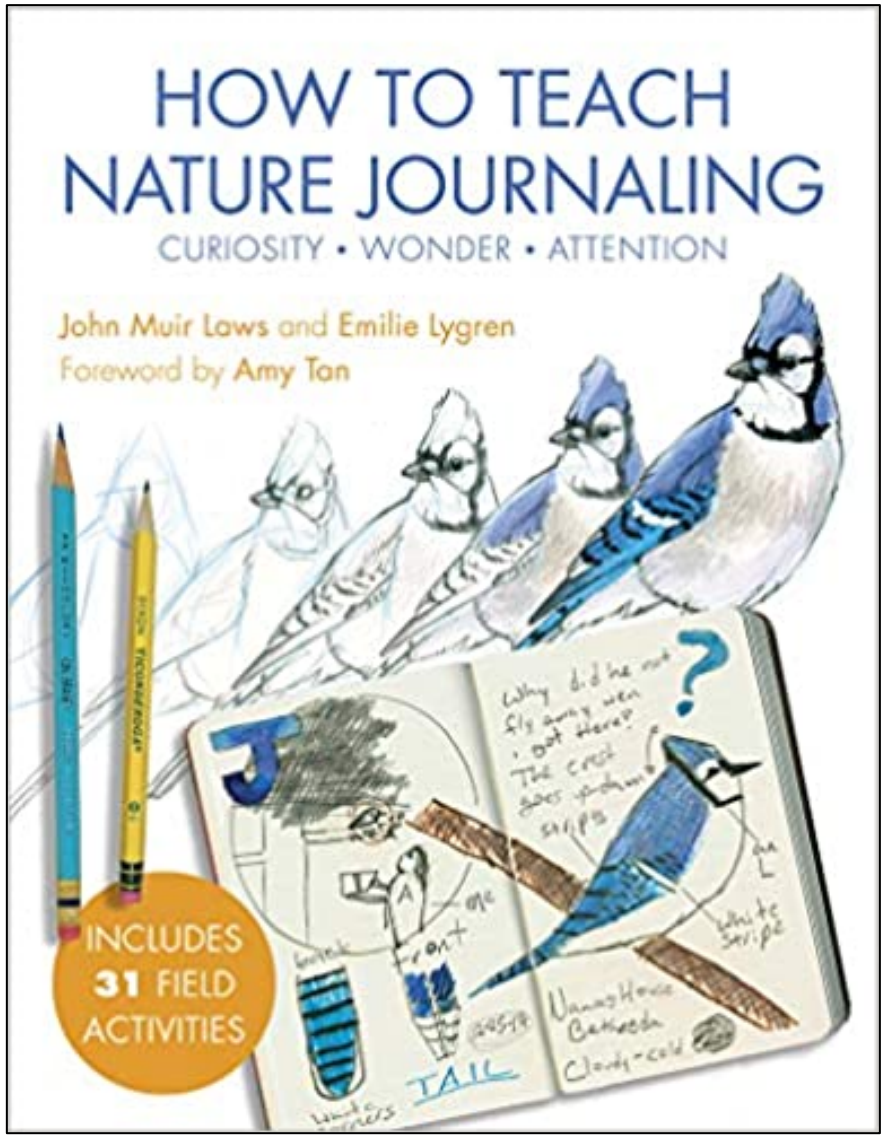
❖VISUAL

❖WRITTEN

❖NUMBERS (Quantitative)

by John Muir Laws

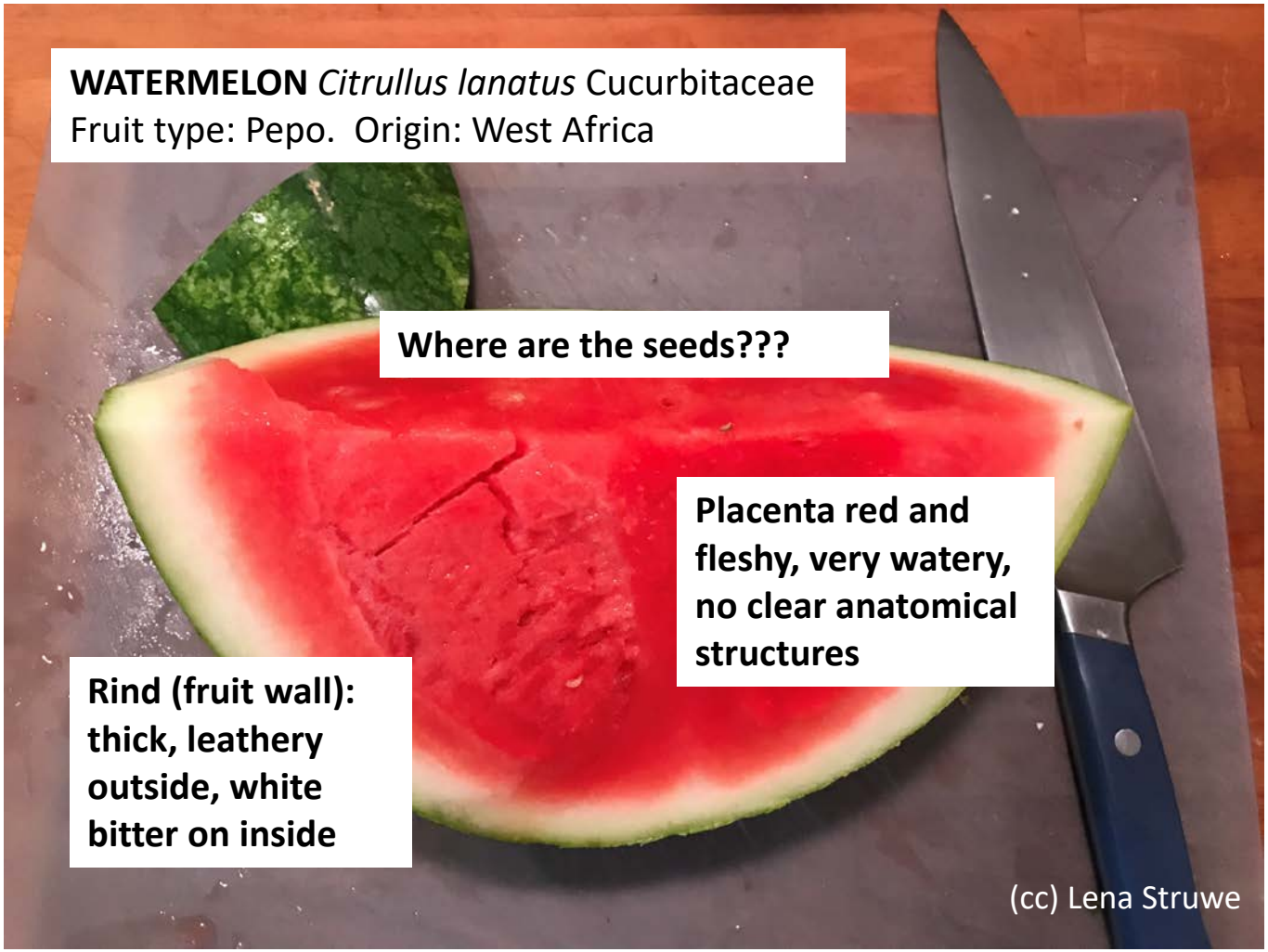
https://johnmuirlaws.com/product/how-to-teach-nature-journaling/



Create dissection labs in kitchens

Students add photos into powerpoint (include token), add labels to show understanding of morphology, share with others to create resources bank and get feedback.

Ask for a fruit, not a specific fruit, to be cut up.



Customized iNaturalist class projects

Driveways

Sidewalks

Lawns

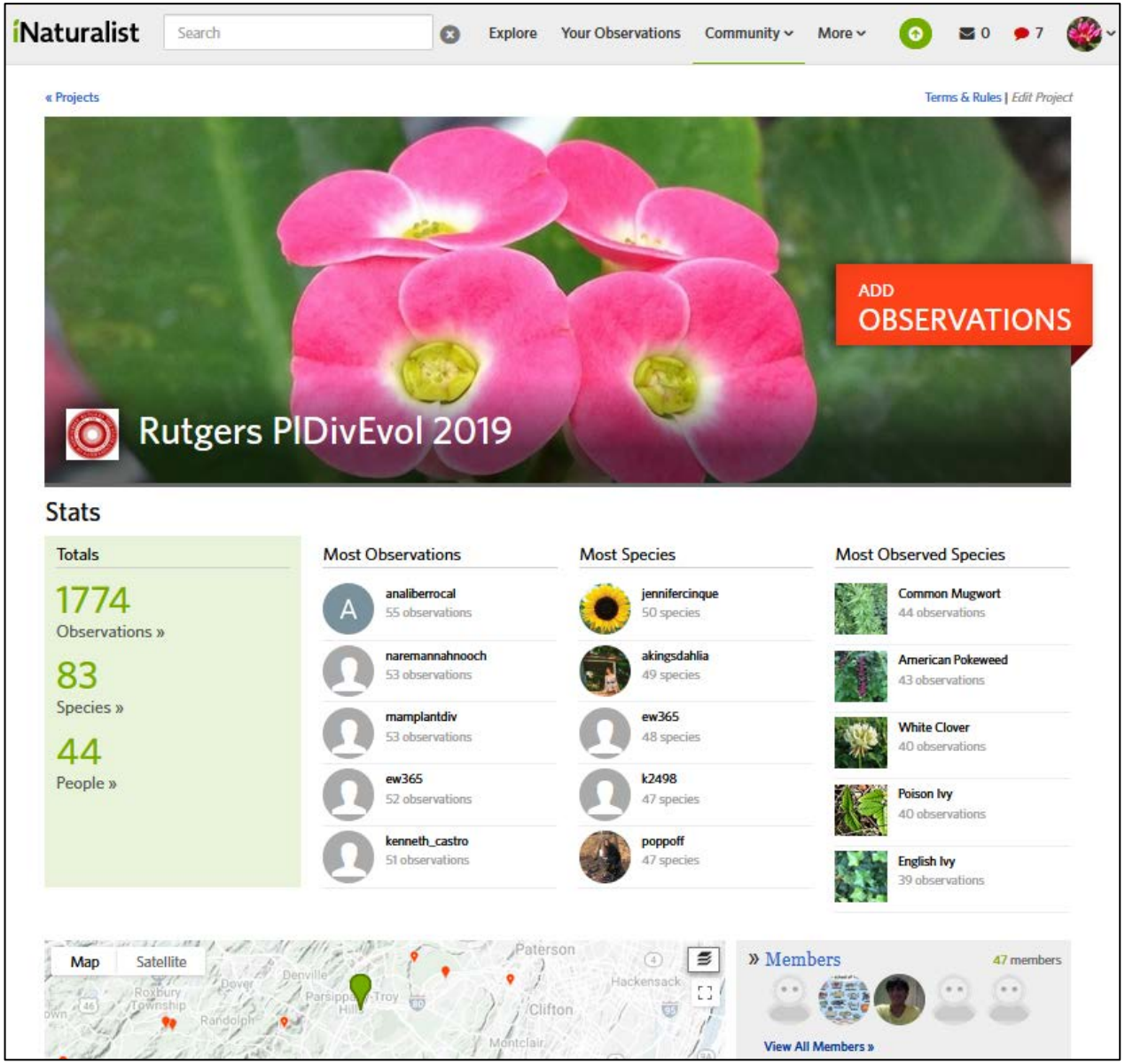
Species bingo

Campus flora

Class bioblitzes

(iNat is focused on naturalized and wild species)

Check out the SEEK app.



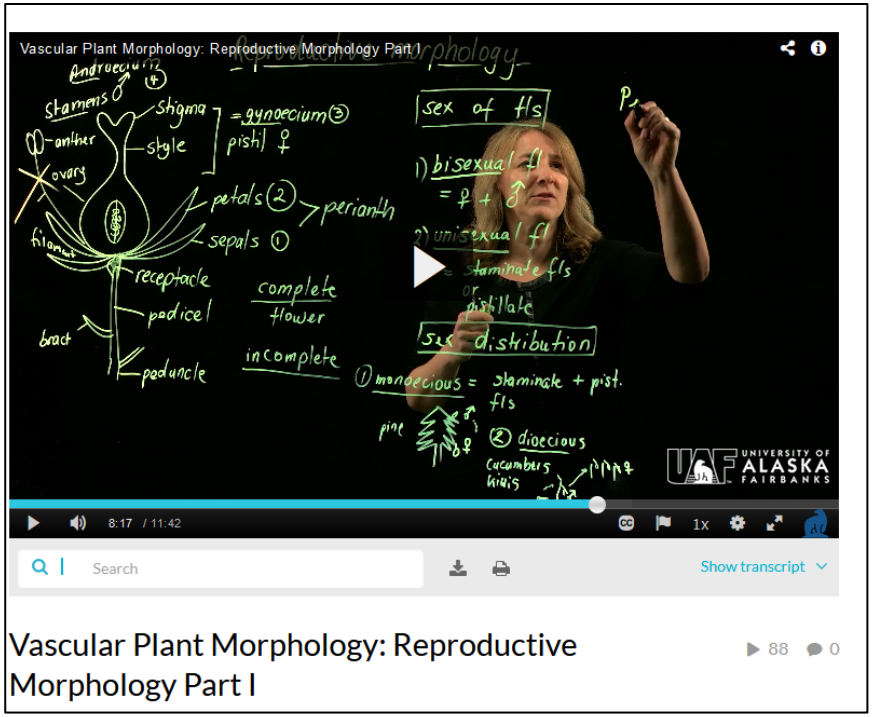
BOTANY DEPOT

Utilize online materials made by instructor (or by other botanists)

Ana Bedoya presents the pineapple in online video from Richard Olmstead's class

(c) Richard Olmstead

Living Glass lectures
by Steffi Ickert-Bond



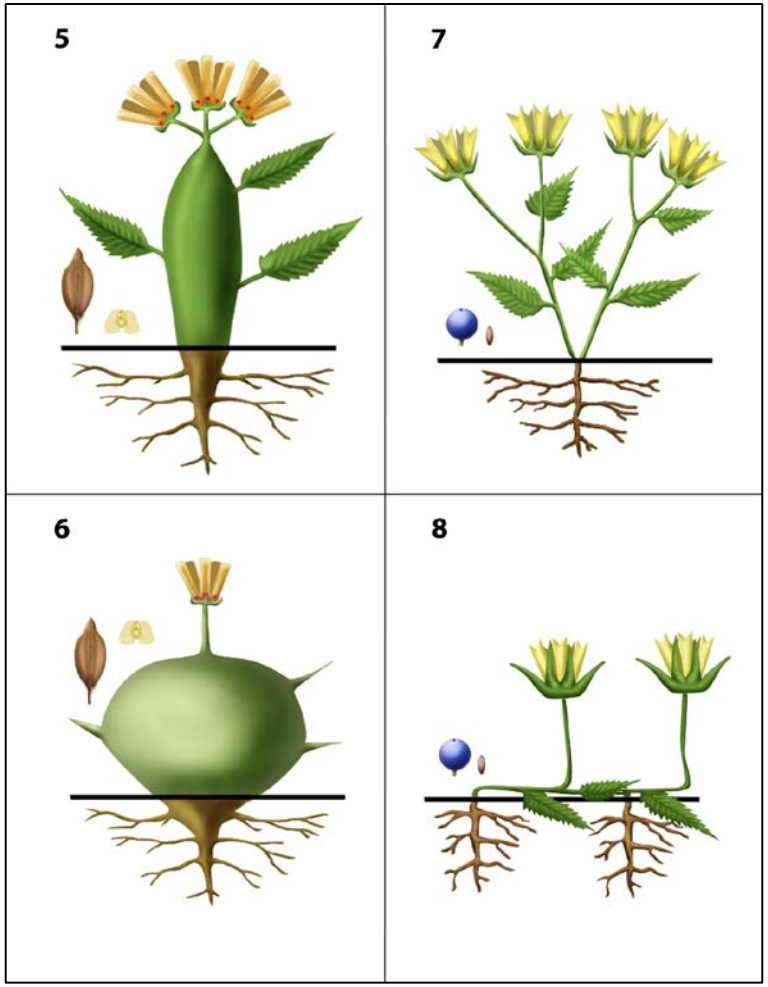
© Steffi Ickert-Bond UAF

Dissecting videos
by Ben Montgomery

Links available at: BOTANY DEPOT

Street tree inventory
by Amy Berkov: species ID and carbon calculations

Dendrogrammaceae
by Lynn Clark



Links available at: BOTANY DEPOT

Conclusions

Effective active learning in online courses is possible, but will take flexibility and strong engagement from instructors.

Potential broader access …***online reality-based botany learning can give access to knowledge and skills for a much larger community than an on-campus-restricted course***.

Share your content, and borrow from others (give credit).

Botany knows no borders; the topic is universal and global and is relevant to all people of the world. Be inclusive, celebrate diversity, be aware of biases.

Thanks!

All contributors to Botany Depot and all participants in the Botany Education in the 21st Century Facebook group

Chrysler Herbarium, Rutgers University

Botanical Society of America

Botanical Accuracy LLC

Resource links:

Botany Depot: https://botanydepot.com/

Botany Education in the 21st Century: https://www.facebook.com/groups/1056168897735912 (apply and answer the three questions in full)

BSA, Teaching Botany Online: https://cms.botany.org/home/resources/online_resources.html

Questions?

(Yes, there will be pets in your botany class if you teach it remotely. Count on it. Students have more cats, dogs or other pets than you know of.)