

# Connecting Students to Citizen Science and Curated Collections

[www.CollectionsEducation.org](http://www.CollectionsEducation.org)



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# PRODUCT. Students contribute real scientific data to three outlets



# Symbiota

Back to awitt's observations  
eastern red cedar (*Juniperus virginiana*) observed by awitt on October 12, 2014

Identification Summary  
Community ID: eastern red cedar  
Suggest an ID  
Map

Description  
Leaves are evergreen, awl-shaped, dark green in color. Twigs are reddish-brown and covered with fine awl-shaped leaves. Bark is also reddish-brown and furrowed. Tree is approximately 100 ft tall. Fruit is a bluish-green cone.

Comments & Identifications



Details Map Comments Linked Resources

MTSU Middle Tennessee State University

Occurrence ID (GUID): 8f14bcd2-a71e-49dd-9377-86bd3ecbe06d  
Taxon: *Juniperus virginiana* L.  
Family: Cupressaceae  
Collector: Ashley Witt 21  
Date: 12 October 2014  
Locality: United States, Tennessee, Polk, Private property. Located on Benton Station Road about 5 miles from Hwy 411.  
35.18878 -84.68475  
Habitat: Growing on an upward slope with well drained soil and in close proximity to a road.  
Associated Species: *Chamaecyparis thyoides*  
Description: Leaves are evergreen, awl-shaped, dark green in color. Twigs are reddish-brown and covered with the awl-shaped leaves. Bark is also reddish-brown and furrowed. Tree is approximately 100 ft tall. Fruit is a bluish-green cone.  
Notes: <http://naturewatch.org.nz/observations/1068045>

Record ID: 8f14bcd2-a71e-49dd-9377-86bd3ecbe06d  
Usage Rights: CC BY-NC-SA (Attribution-NonCommercial-ShareAlike)  
For additional information on this specimen, please contact Ashley B. Morris, Curator ([amorris.mtsu@gmail.com](mailto:amorris.mtsu@gmail.com))

GBIF.org  
Free and open access to biodiversity data

Data News Community About

<http://www.inaturalist.org/observations/1068045>  
Human Observation of *Juniperus virginiana* L. recorded on Oct 12, 2014  
from iNaturalist research-grade observations dataset

Information Verbatim



# CONTEXT. Managing an herbarium in the digital age takes extra time



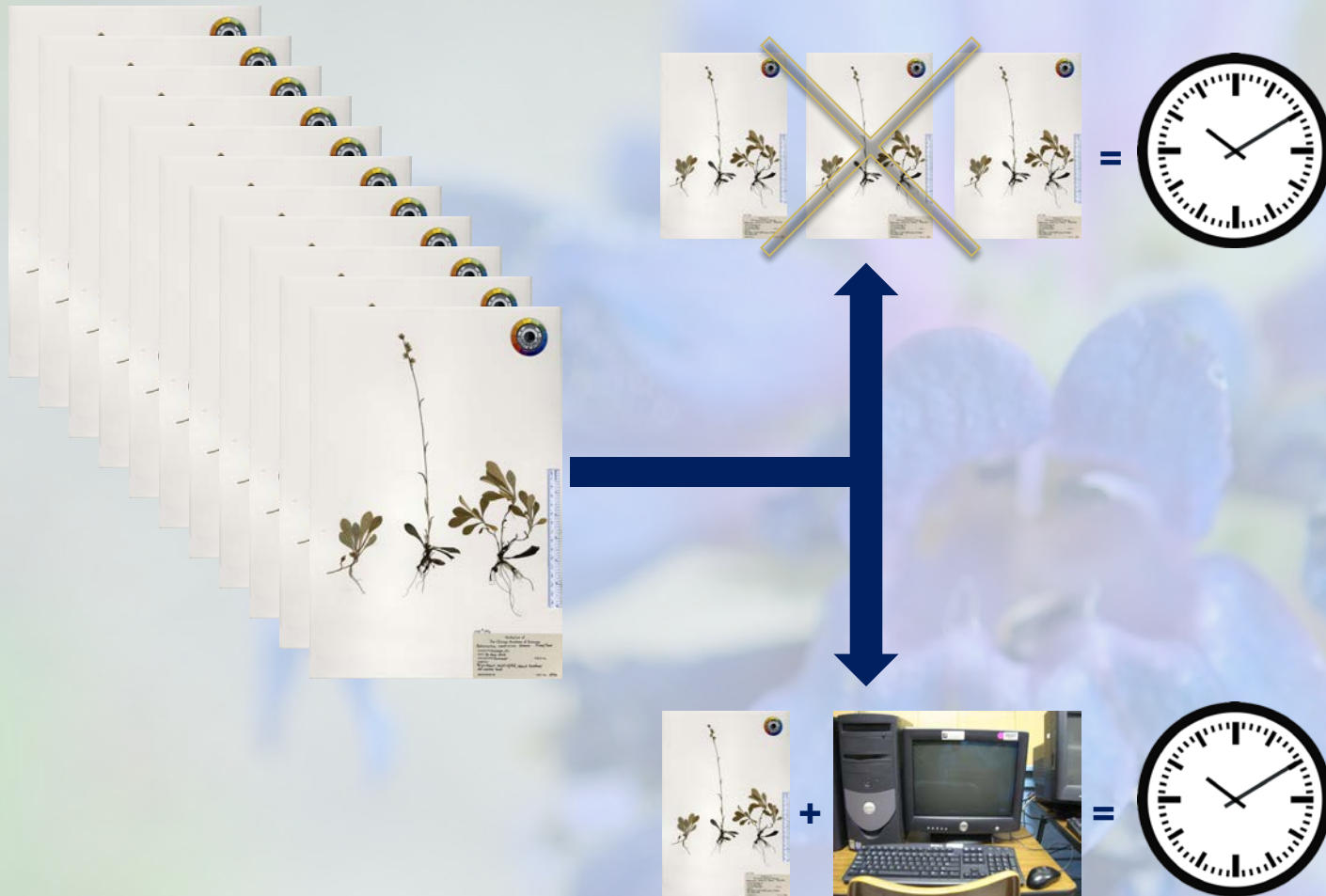
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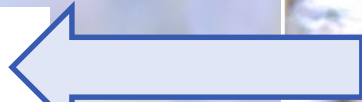
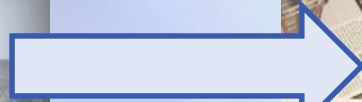
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# CONTEXT. Managing student contributions to said herbarium takes even more time



# CONCEPT. Streamline by creating digitally native data for new specimens



## Symbiota

Herbarium of the Chickering  
American River Reserve

Polygonaceae

*Aconogonon phytolaccifolium*

United States, California, Placer County, North Fork American River Headwaters Basin, 0.25 mi along trail E of The Land of the Lost. N of river. 39.253354N -120.38404W +90 meters [WGS84] Riparian. Large plant, 3-5 ft tall. Locally abundant. <http://www.inaturalist.org/observations/755941>

E. Krimmel  
With: F. Felix

26 June 2014



Connecting Students to Citizen Science and Curated C...

Stats	Most observations	Most species	All observations	All species	All people
Total: 1334 observations	jenifferreed 87 observations	jenifferreed 7% species	flowering Dogwood 34 observations	American Sweetgum 33 observations	Winged elm 27 observations
298 species	nkaylahughes 54 observations	angelmachine 46 species	American Sweetgum 27 observations	Eastern Redbud 27 observations	
56 people	codharken2 53 observations	nkaylahughes 29 species			
	angelmaschine 46 observations	codharken2 37 species			
	schridmer 37 observations	schridmer 37 species			



iNaturalist

# CONTEXT. “Vision and Change in Undergraduate Biology Education”



**Ensure that undergraduate biology courses are active, outcome oriented, inquiry driven, and relevant.**

# CONCEPT. Add objectives to curriculum inspired by Vision & Change

Students completing this assignment will be able to:

1. Maintain a professional specimen collection notebook.
2. Collect plant specimens from the field using proper techniques and including adequate material for identification.
3. Identify unknown plant specimens using multiple forms of reliable evidence.
4. Prepare and deposit research quality herbarium specimens.
5. Explain the importance of herbaria in plant biology research.
6. Deposit species and occurrence data into national/international databases.
7. Discuss the value of large data sets for investigating large spatial- or temporal-scale phenomena. (invasive species, rare species, climate change, etc.)
8. Evaluate the importance of citizen scientists to large data sets.

# PRODUCT. Students contribute real scientific data to three outlets



# Symbiota

Back to user's observations  
eastern red cedar (*Juniperus virginiana*) observed by awitt on October 12, 2014

**Identification Summary**

Community ID: eastern red cedar *Juniperus virginiana* (Accepted)

Suggest an ID

Tag: 8752  
Added Nov 10, 2014 23:27:42 -0600  
Collector: awitt  
Locality: Tennessee: Private property. Located on Benton Station Road about 5 miles from Hwy 411  
Habitat: Growing on an upward slope with well drained soil and in close proximity to a road.  
Associated Species: *Chamaecyparis thuyoides*  
Plant Family: Cupressaceae  
Observations: 1

**Description**

Leaves are evergreen, awl-shaped, dark green in color. Twigs are reddish-brown and covered with fine awl-shaped leaves. Bark is also reddish-brown and furrowed. Tree is approximately 100 ft tall. Fruit is a bluish-green cone.

**Comments & Identifications**

awitt (ID) eastern red cedar  
1 month ago

perlmutter (ID) eastern red cedar  
1 month ago



Details Map Comments Linked Resources

MTSU Middle Tennessee State University

Occurrence ID (GUID): 8f14bcd2-a71e-49dd-9377-86bd3ecbe06d  
Taxon: *Juniperus virginiana* L.  
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Notes: <http://naturewatch.org.nz/observations/1068045>

Record ID: 8f14bcd2-a71e-49dd-9377-86bd3ecbe06d  
Usage Rights: CC BY-NC-SA (Attribution-NonCommercial-ShareAlike)  
For additional information on this specimen, please contact Ashley B. Morris, Curator (amorris.mtsu@gmail.com)

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Information Verbatim





# PRODUCT. Course curriculum, hosted on custom website

## Connecting Students to Citizen Science and Curated Collections

STUDENTS CONTRIBUTING TO OUR UNDERSTANDING OF GLOBAL BIODIVERSITY

Course Documents

Instructor Login

### What?

Learn about plant systematics and collecting in the context of our information-rich digital age. Connect physical plant specimens to citizen science observations and online herbarium databases. Explore how making these connections helps contribute to our understanding of global biodiversity.



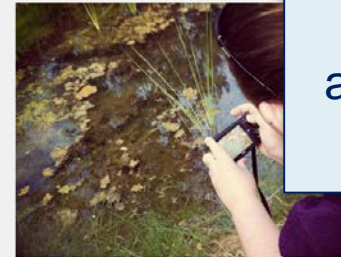
### Why?

This project will help prepare you to be an information-literate scientist, with an understanding of what biological collections data represent, where they come from, and how they can be used.



### How?

You will complete this project through a combination of traditional plant taxonomy instruction, participation in citizen science, and exposure to online databases.

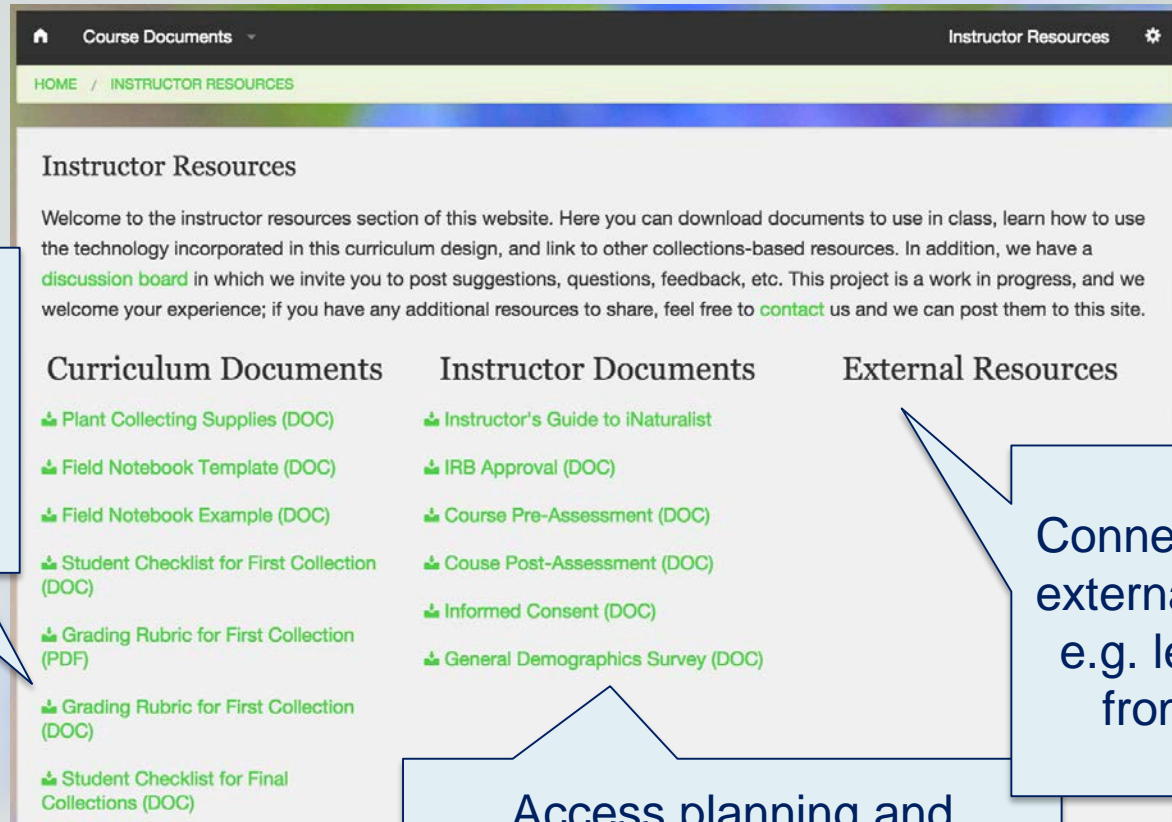


Students access course documents online

Website provides content management and framework for project

[www.CollectionsEducation.org](http://www.CollectionsEducation.org)

# PRODUCT. Instructor resources section of the website (login required)



Download  
editable  
versions of  
documents

Connect to existing  
external resources,  
e.g. lesson plans  
from AIM-UP

Access planning and  
research documents

[www.CollectionsEducation.org](http://www.CollectionsEducation.org)

# PRODUCT. Qualitative data to support research on curriculum efficacy



Pre/Post **Opinion Survey** (Likert scale) and **Knowledge Assessment** (free form) with the research goals of:

- Quantitative comparison of Likert survey values
- De-identification, coding, and analysis of free-form responses

Not at all Prepared (1)	Somewhat Prepared (2)	Well Prepared (3)	Very Well Prepared (4)	Totally Prepared (5)
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Not at all important (1)	Somewhat important (2)	Important (3)	Very Important (4)	Necessary (5)
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IRB  
Approved

# OUTCOME. Herbarium staff workload for menial tasks is reduced

Digitally  
native  
data



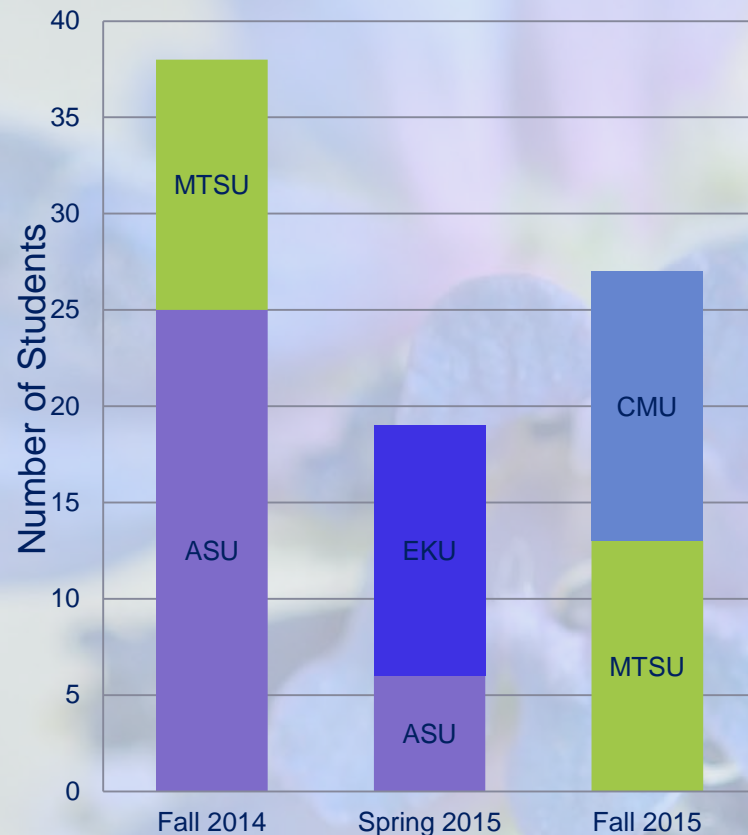
Shared resources  
(curriculum,  
student resources,  
technical support)



# OUTCOME. Students enjoy the course experience

“Experienced the need for citizen scientists, and how my contribution will benefit others and myself for years to come”

“The project is really good for getting students interested in biological collecting and identifying things”



“Creating a collection inspired me to learn more about the plant diversity”

“Great learning experience!”

“Although not my best subject, by far my most favorite class”

Quotes from Fall 2014 student survey.

# OUTCOME. Students feel well-prepared leaving the course

## How well has the specimen and data collection project prepared you to...

Maintain a professional specimen collection notebook?	very well (4.0)	Explain the importance of herbaria in plant biology research?	very well (3.9)
Collect plant specimens from the field using proper techniques and including adequate material for identification?	very well (4.4)	Deposit species observations and occurrence data into national/ international databases?	very well (4.2)
Identify unknown plant specimens using multiple forms of reliable evidence?	very well (4.3)	Discuss the value of large datasets for investigating large spatial- or temporal-scale phenomena?	well (3.2)
Make and deposit research-quality herbarium specimens?	very well (4.2)	Evaluate the importance of citizen scientists' contributions to large data sets?	very well (3.7)

Not at all Prepared (1)	Somewhat Prepared (2)	Well Prepared (3)	Very Well Prepared (4)	Totally Prepared (5)
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Data from Fall 2014 student survey.

# OUTCOME. Students feel well-prepared leaving the course

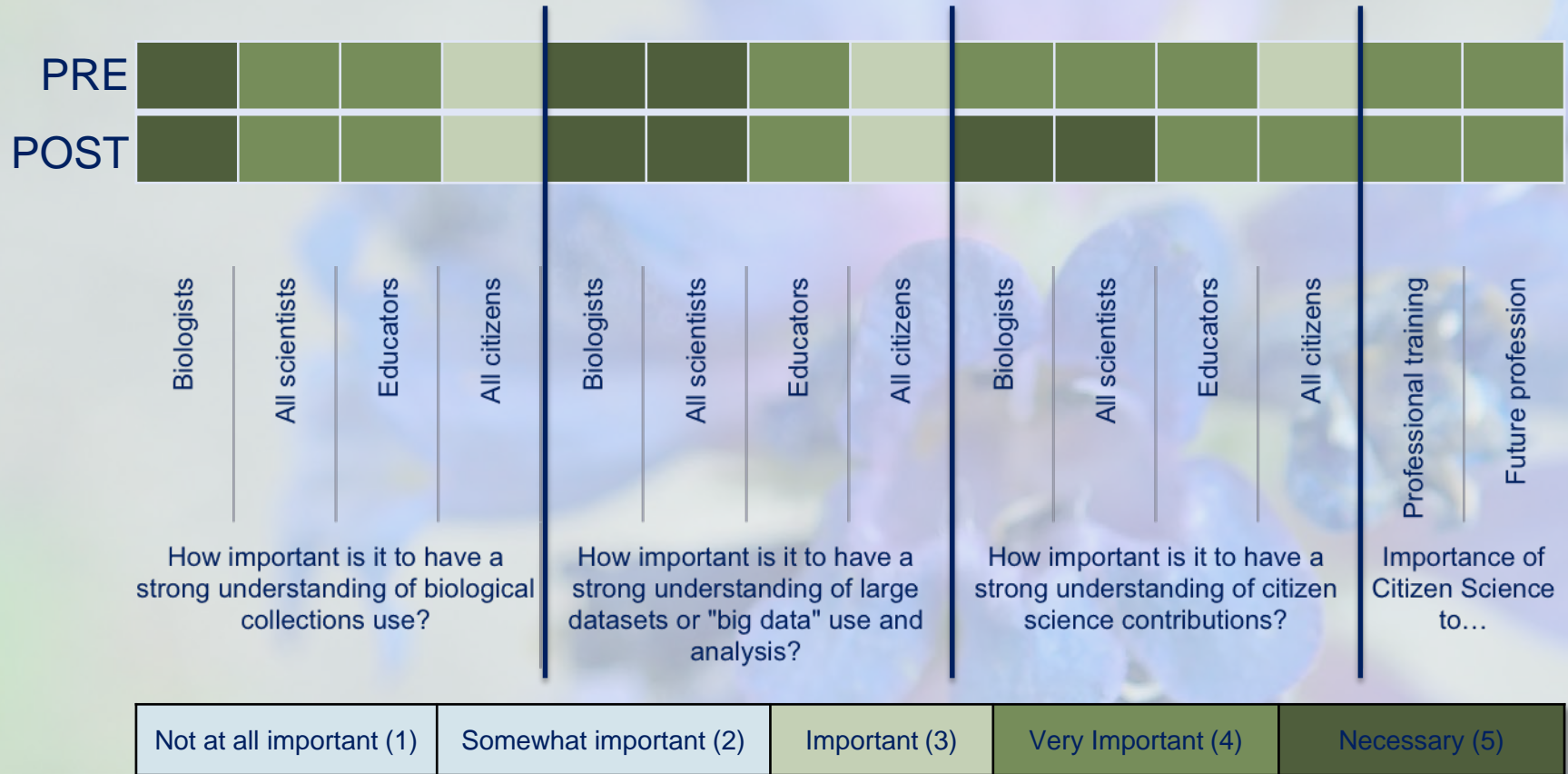
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Data from Fall 2014 student survey.

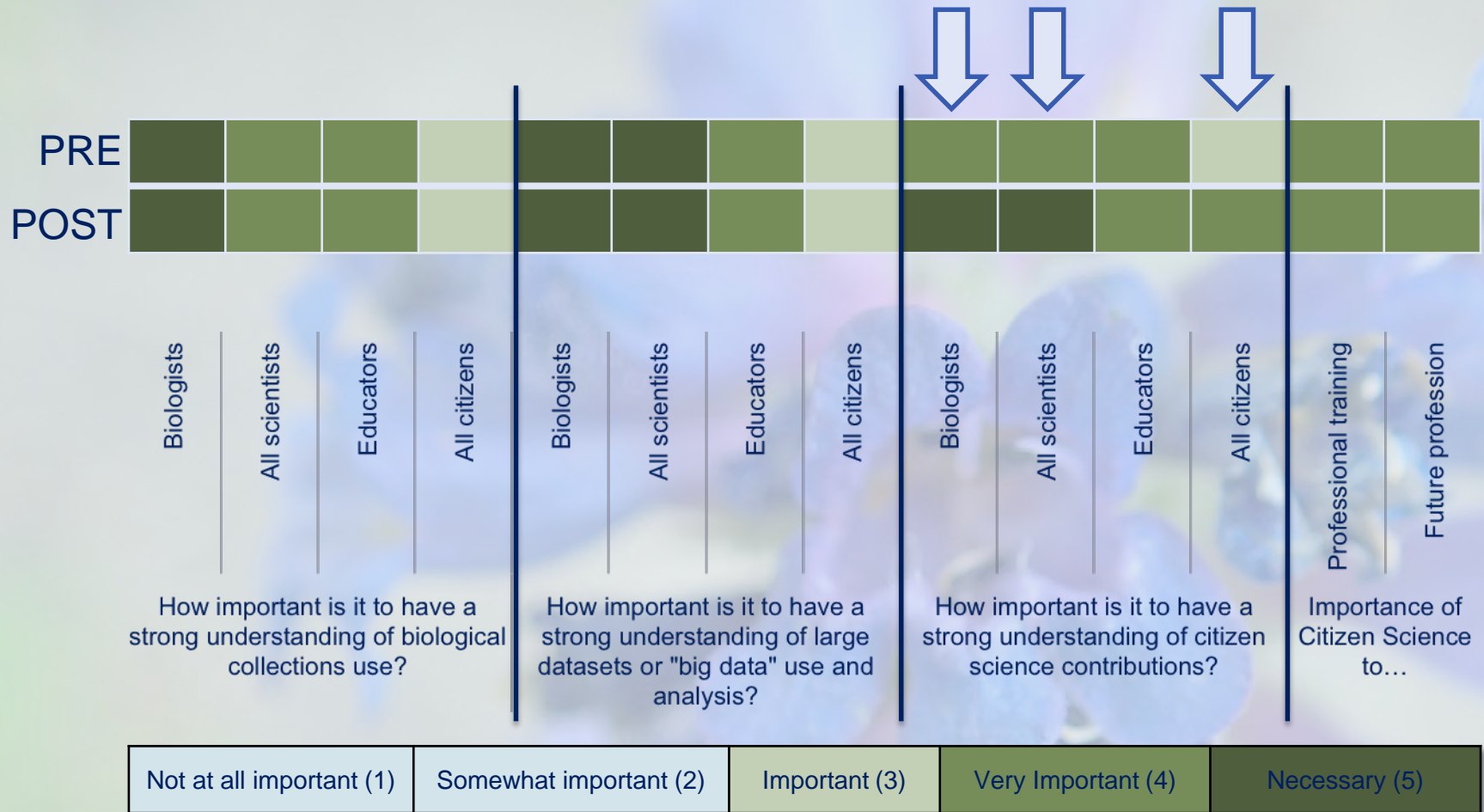
# OUTCOME. Students gain an appreciation for the value of citizen science



Data from Fall 2014 student survey.



# OUTCOME. Students gain an appreciation for the value of citizen science



Data from Fall 2014 student survey.

# OUTCOME. Students engage with each others' collections

*Celtis occidentalis* (Genus *Celtis*) observed by nikaylahughes on October 11, 2014



Photo © NIKayla Hughes, some rights reserved



Location: AR (Google, OSM)  
Places: Marion, US-AR, US, NA [More...](#)  
Lat 36.122066, Lon -92.550518  
Accuracy: 11m  
Geoprivacy: open

## Identification Summary

nikaylahughes's ID:  
**Hackberry** (*Celtis occidentalis*)  
[Agree?](#)

Community ID:  
**Hackberry** (Genus: *Celtis*) [Agree?](#)  
[About](#)

1 person agrees

## Suggest an ID

Species unknown

## Projects

[Connecting Student](#)

[Add to project](#)



View 4 from

## Comments & Identifications

[nikaylahughes's ID: sugarberry](#) (*Celtis laevigata*) [Agree?](#)

Posted by nikaylahughes 6 months ago



Did you rule out *Celtis occidentalis*? I can confirm to genus only. This area has both species.

Posted by royaltlyer 6 months ago



royaltlyer's ID: **Hackberry** (Genus: *Celtis*) [Agree?](#)

Posted by royaltlyer 6 months ago



We'll the leaves had characteristics similar to both (with some kinda overlapping) and they were a little roughed up so I went with leavigata. So, only kinda sorta, but it maybe more accurate.

Posted by nikaylahughes 6 months ago



nikaylahughes's ID: **Hackberry** (*Celtis occidentalis*) [Agree?](#)

Posted by nikaylahughes 6 months ago

## Data Quality Assessment

Community-supported ID?	Yes	0 people agree 1 person disagrees
Date?	Yes	
Georeferenced?	Yes	
Photos or sounds?	Yes	
Is the organism wild/naturalized?	Unknown	What do you think? <input type="button" value="Yes"/> <input type="button" value="No"/>
Does the location seem accurate?	Unknown	What do you think? <input type="button" value="Yes"/> <input type="button" value="No"/>
Does the date seem accurate?	Unknown	What do you think? <input type="button" value="Yes"/> <input type="button" value="No"/>
Appropriate?	Yes	
Quality grade	<b>research</b>	

[Hide details](#)

Observation © nikaylahughes  
 some rights reserved

Is this observation inappropriate, spam, or offensive? [Flag this observation](#)

If you think this observation is inaccurate, please add an ID, participate in the quality assessment above, or describe the inaccuracy in a comment.

# OPPORTUNITY. Engage students in data use exercise

## How well has the specimen and data collection project prepared you to...

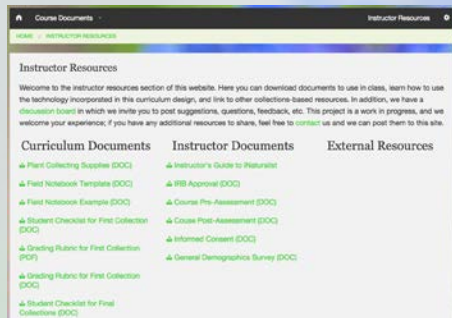
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Data from Fall 2014 student survey.

# OPPORTUNITY. Engage instructors at other institutions



Check out [www.CollectionsEducation.org](http://www.CollectionsEducation.org)



Use our instructor resources...  
*Trial username: guest\_instructor*  
*Trial password: guest*



Drop us a line: [info@collectionseducation.org](mailto:info@collectionseducation.org)

# CONCLUSION. Small collections working together get things done



# ACKNOWLEDGEMENTS



Gil Nelson & the iDigBio Botany 2014 Workshop

Ed Gilbert (Symbiota)

SERNEC TCN

Great Lakes Invasive Species TCN

California Consortium of Herbaria

Faerthen Felix (Sagehen Creek Field Station)

And of course, all of the student participants!