QUBES

Supporting faculty in teaching and the interface of math x biology

Carrie Diaz Eaton
Unity College

Sam Donovan
University of Pittsburgh

M. Drew LaMar
The College of William and Mary

Kristin Jenkins
BioQUEST

Jeremy Wojdak
Radford University

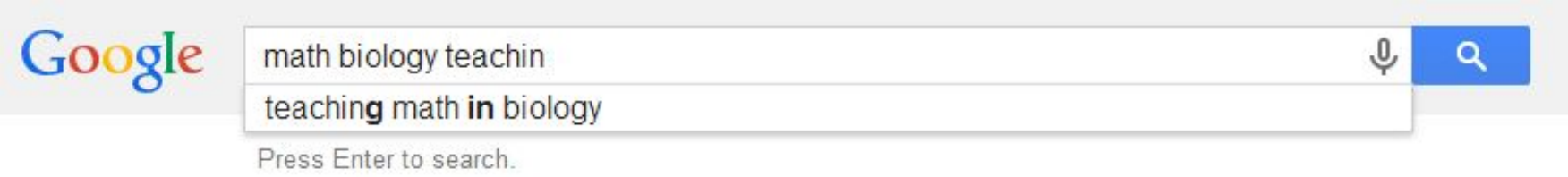
QUBES
The Power of Biology × Math × Community

Introductions

- I am a mathematician in a biology department
- Small liberal arts environmental college which emphasizes sustainability science with interdisciplinarity/transdisciplinarity at core
- Evolutionary community ecologist
- Transform math courses to regain relevance (technical math vs theoretical)
  - lonely and inefficient process
  - teaching shared at conference - resource limitations
  - best practices?

QUBES
The Power of Biology × Math × Community

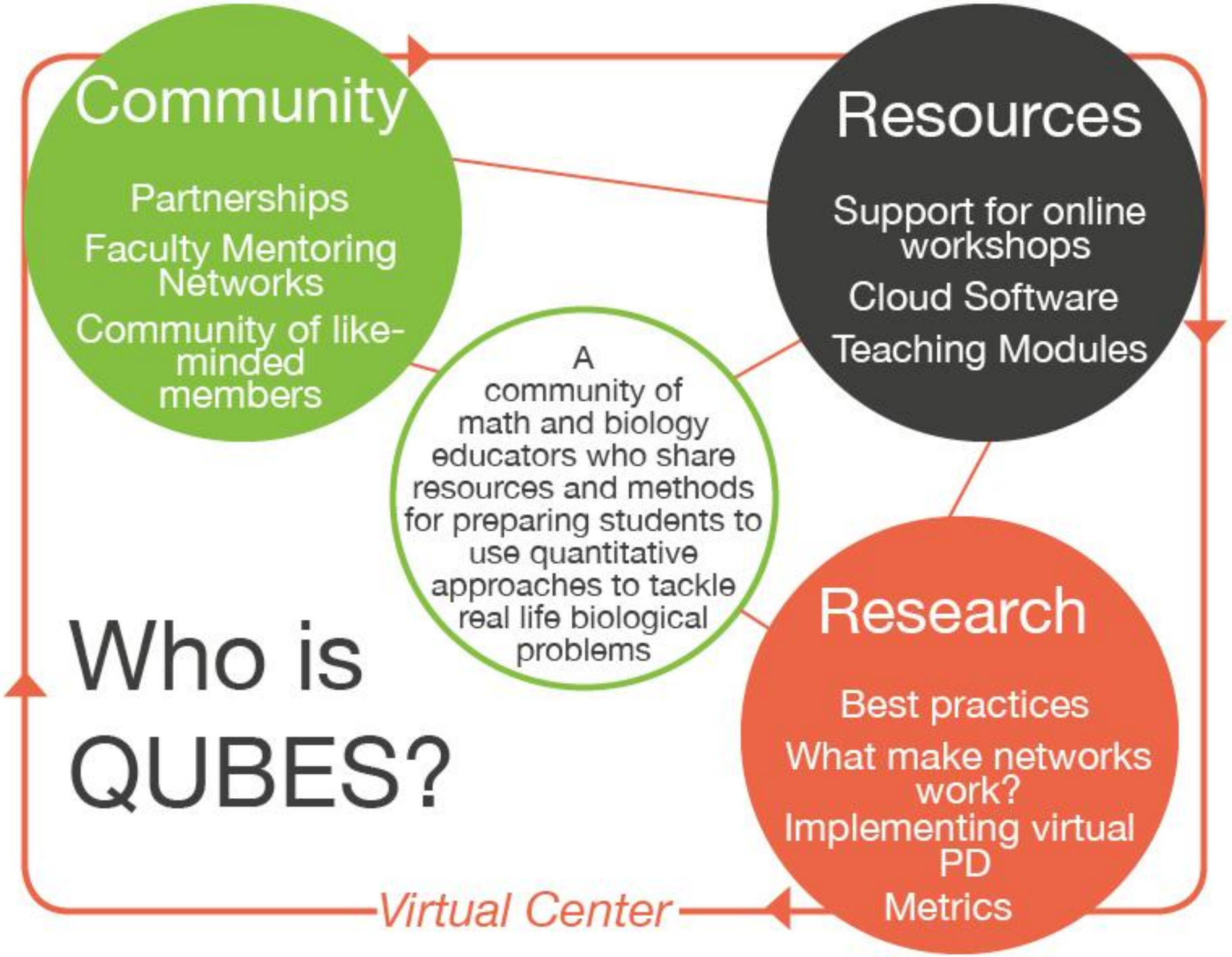
QUBES: Quantitative Undergraduate Biology Education and Synthesis



The **synthesis** problem: Entities from mathematics and biology are working **independently** to create curriculum, content, and **educational experiences**, at the interface of these two fields, with the intended audience both **mathematics and biology** students.

How do we bring it all together??

QUBES
The Power of Biology × Math × Community


Community
Partnerships
Faculty Mentoring Networks
Community of like-minded members
Resources
Support for online workshops
Cloud Software
Teaching Modules
A community of math and biology educators who share resources and methods for preparing students to use quantitative approaches to tackle real life biological problems
Research
Best practices
What make networks work?
Implementing virtual PD
Metrics
Who is QUBES?
Virtual Center

QUBES Hub - qubeshub.org

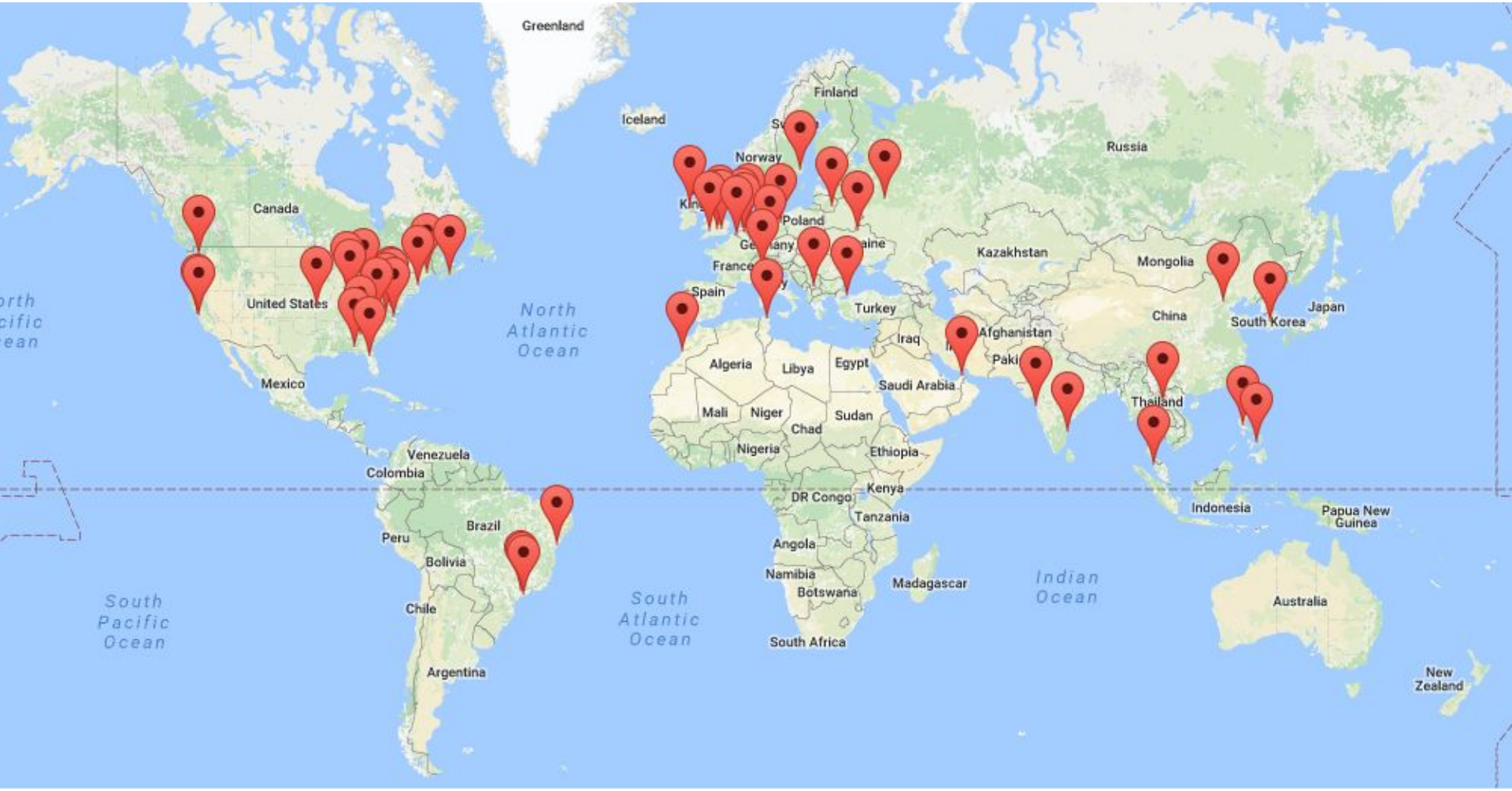
Vision for QUBES Virtual Center

1. Foster collaboration beyond silos (disciplinary language, place)

QUBES
The Power of Biology × Math × Community

Donovan, *et al.* 2014

Community without borders?



QUBES

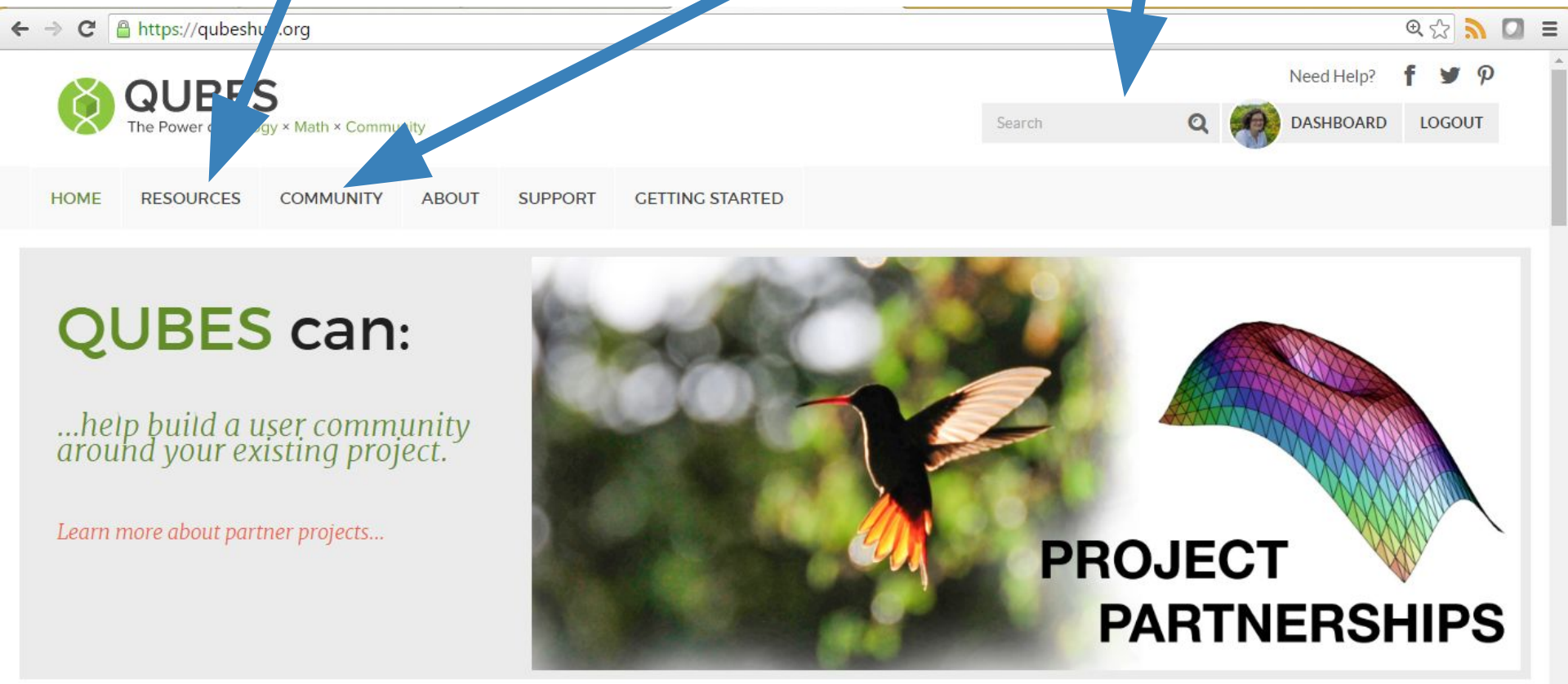
The Power of Biology × Math × Community

Navigation

Search here for anything

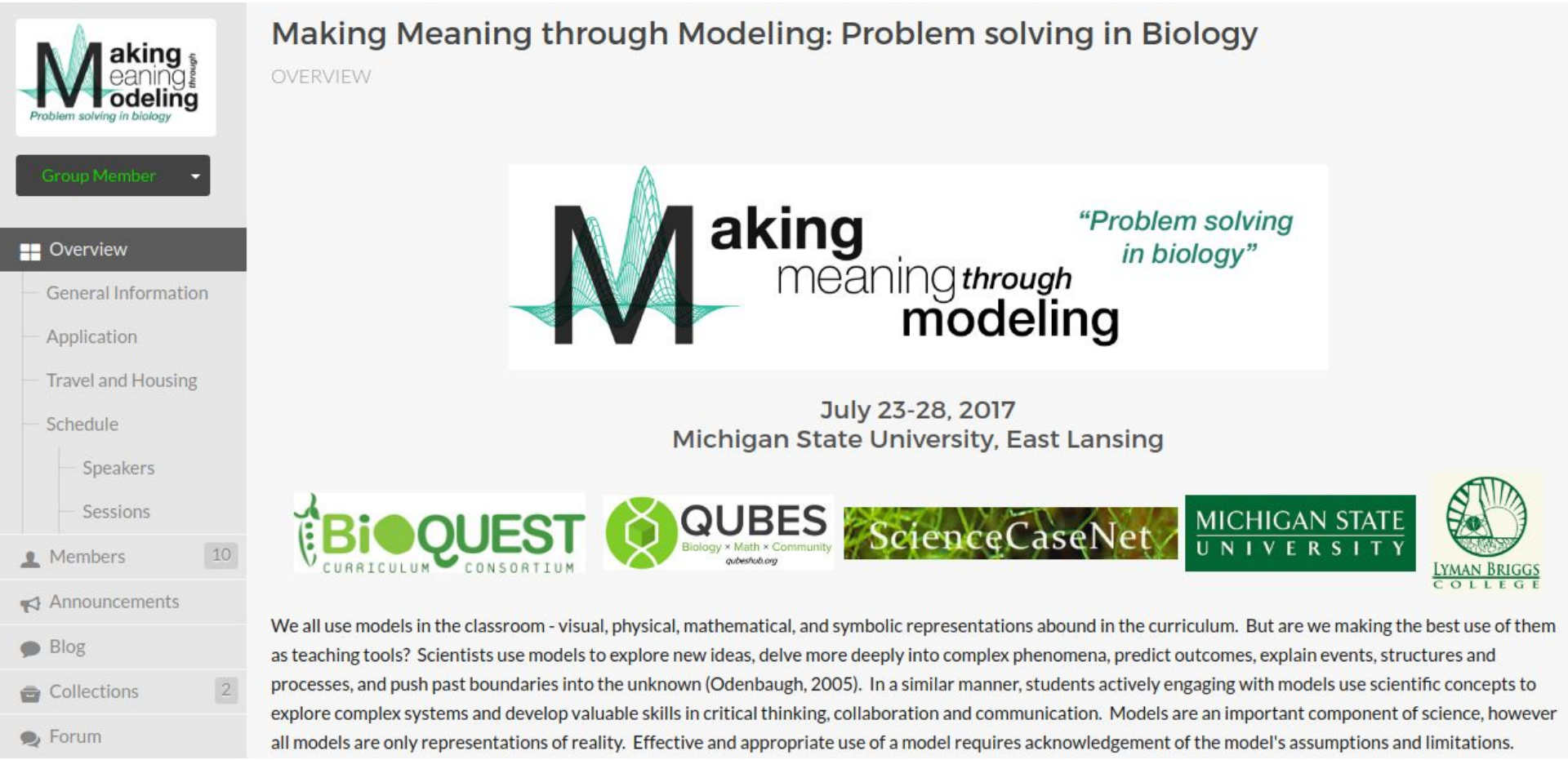
Simulators, resources, collections

Groups



QUBES
The Power of Biology × Math × Community

Groups for Meetings and Workshops



QUBES
The Power of Biology × Math × Community

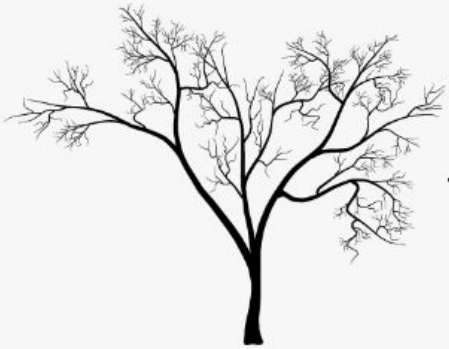
Open Community Groups

Group Manager

- Overview
  - Joining & Useful Features
- Members 6
- Announcements
- Collections 16
- Courses
- Forum 1
- Projects
- Resources
- Files
- Activity

OVERVIEW

calculus



Calculus for the Life Sciences

Welcome to the Calculus for the Life Sciences Group. We are a community of educators dedicated to sharing resources for teaching calculus in the classroom. Our goal is to connect, share, and discuss various resources and teaching approaches to calculus for students in the life sciences.

Browse our resources or get involved and join our page!

All the resources here are available for anyone to browse through. If you want to add to this site, join our group and contribute!

Come see our Collections

Our Collections page displays all our user generated links of resources that

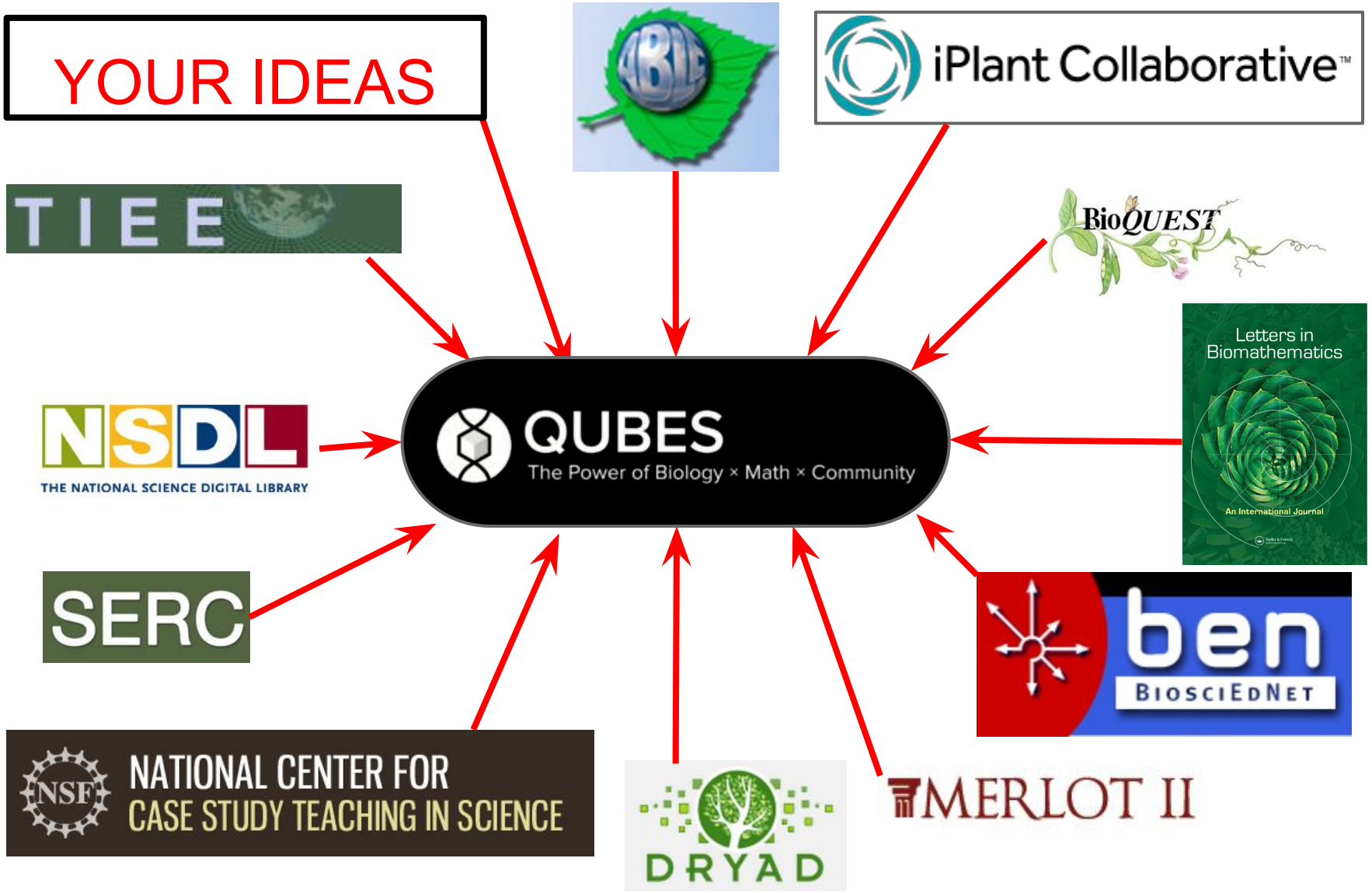
Browse resources or contribute your own

Resources in this group are works that have been submitted by our members.

QUBES
The Power of Biology × Math × Community

Research Groups

QUBES
The Power of Biology × Math × Community



QUBES

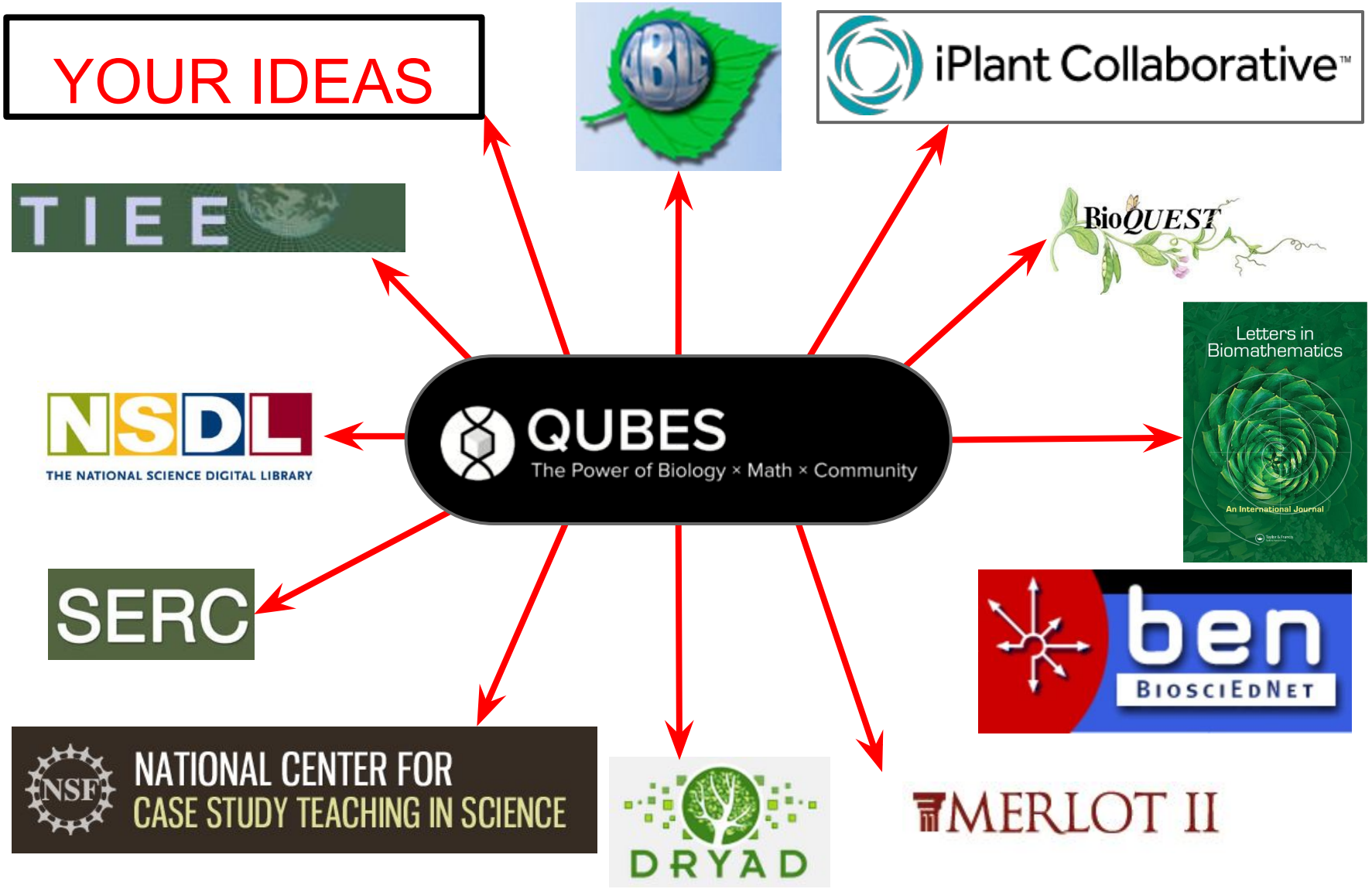
The Power of Biology × Math × Community

From Idea to Product

Virtual collaboration space

QUBES
The Power of Biology × Math × Community

http://www.webmd.com/parenting/d2n-stopping-germs-12/slideshow-kids-germs-handwashing
http://sf.funcheap.com/event-series/carve-san-francisco-sandcastle-building-contest/



QUBES
The Power of Biology × Math × Community

Vision for QUBES Virtual Center

1. Foster collaboration beyond silos (interdisciplinary language, place)
2. An easily searchable hub/repository for multiple types of quality curriculum/research objects

QUBES
The Power of Biology × Math × Community

Donovan, *et al.* 2014

Qubeshub.org Simulation Tools

Resources: Software

Featured Software

R-Studio IDE for R

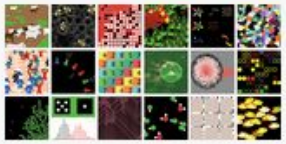
RStudio is a GUI for R, the statistical programming language.

Launch RStudio | RStudio page

Links of interest:

Using R in the Classroom

NetLogo



NetLogo is a multi-agent programmable modeling environment. It is used by tens of thousands of students, teachers and researchers worldwide.

Launch NetLogo | NetLogo page

Links of interest:

Using NetLogo in the Classroom

QUBES

The Power of Biology × Math × Community

QUBES - Evolving community of resources and users

- YOU are QUBES.
- User contributed
  - If it isn't there - contribute it!
  - Make your work more visible
    - Presented something in the education sessions?
    - People are asking where to find it?
    - Want to know how people are using it later?
  - Share a favorite resource
- Resources evolve in community

QUBES

The Power of Biology × Math × Community

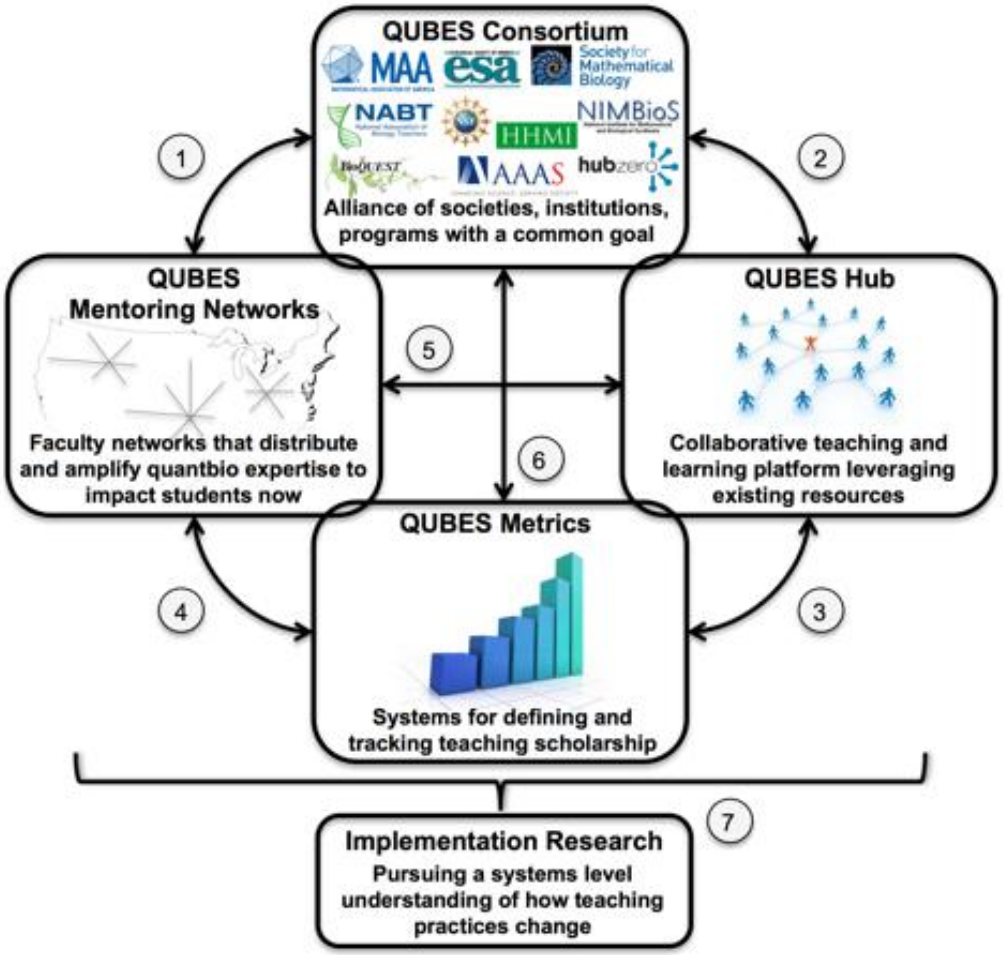
Vision for QUBES Virtual Center

1. Foster collaboration beyond silos (language!)
2. A searchable hub/repository for multiple types of quality curriculum/research objects
3. Support faculty through implementation

QUBES
The Power of Biology × Math × Community

Donovan, *et al.* 2014

Adopting, adapting, assessing



- Distributing Faculty Expertise
- Mentoring programs
- Community curriculum development and assessment
- PIs
  - Sam Donovan
  - Jeremy Wojdak
  - Kristin Jenkins

QUBES
The Power of Biology × Math × Community

Donovan, *et al.* 2014

Vision for QUBES Virtual Center

1. Foster collaboration beyond silos (language!)
2. A searchable hub/repository for multiple types of quality curriculum/research objects
3. Support faculty through implementation
4. Research-informed teaching

QUBES

The Power of Biology × Math × Community

Donovan, *et al.* 2014

Research-informed teaching

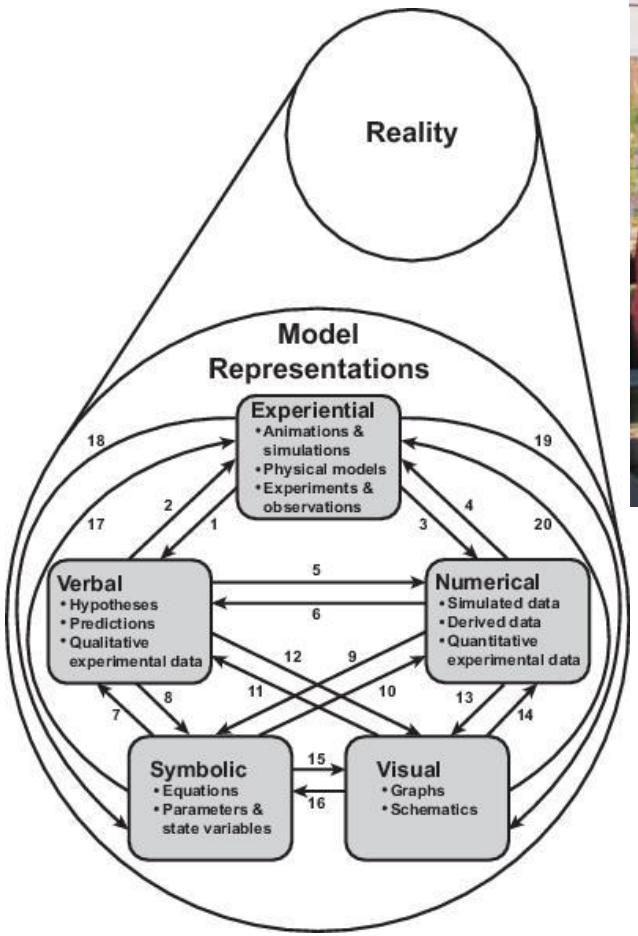
- Not just curriculum
- Collected and synthesized research-based practices teaching mathematics for biological applications and biology audiences
- Example:
  - FMNs with research-derived data sets
  - Faculty mentoring networks implementation research
  - BioMAAP, attitudes and anxieties
  - NIMBioS Working group on modeling
  - Biocalculus, SUMMIT-P, teaching with data

QUBES

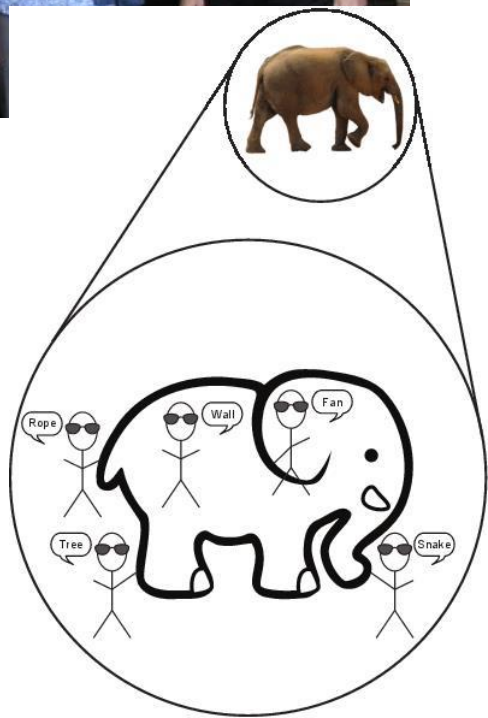
The Power of Biology × Math × Community

Eaton, *et al.* 2017

NIMBioS Working Group - teaching modeling to biology students



Interdisciplinary - math, math ed, physics ed, biology, science ed, bio ed

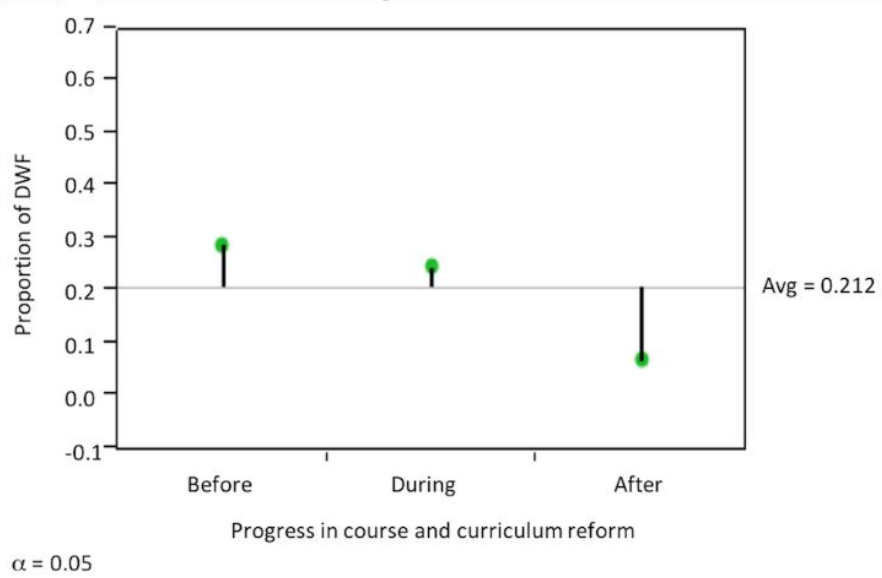


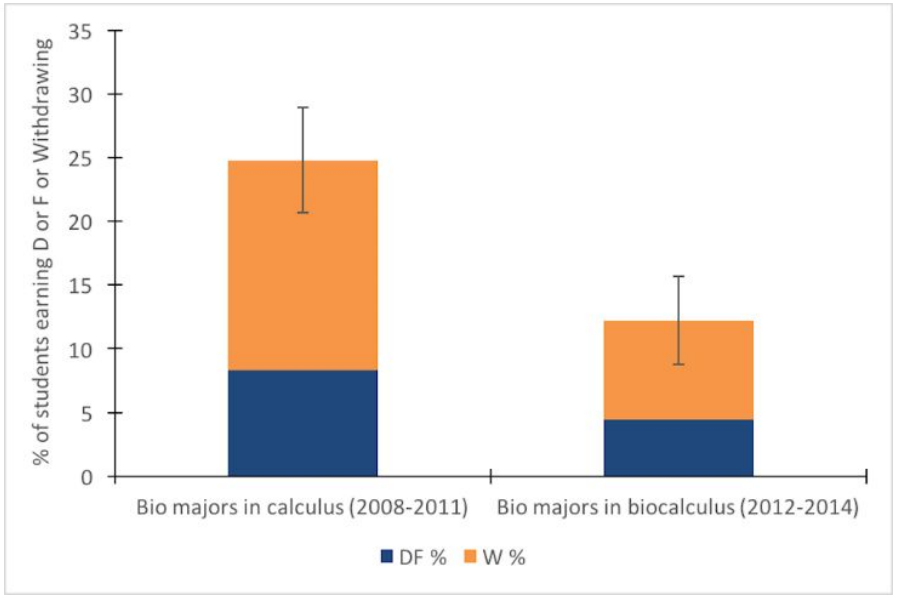
QUBES
The Power of Biology × Math × Community

Eaton, *et al., PRIMUS* (in review)

Education research projects (Bio)Calculus

- Retooling Calculus I/II for the needs of wildlife, ecology, and environmental science
- Joint work with Dr. Hannah (Callender) Highlander, University of Portland.

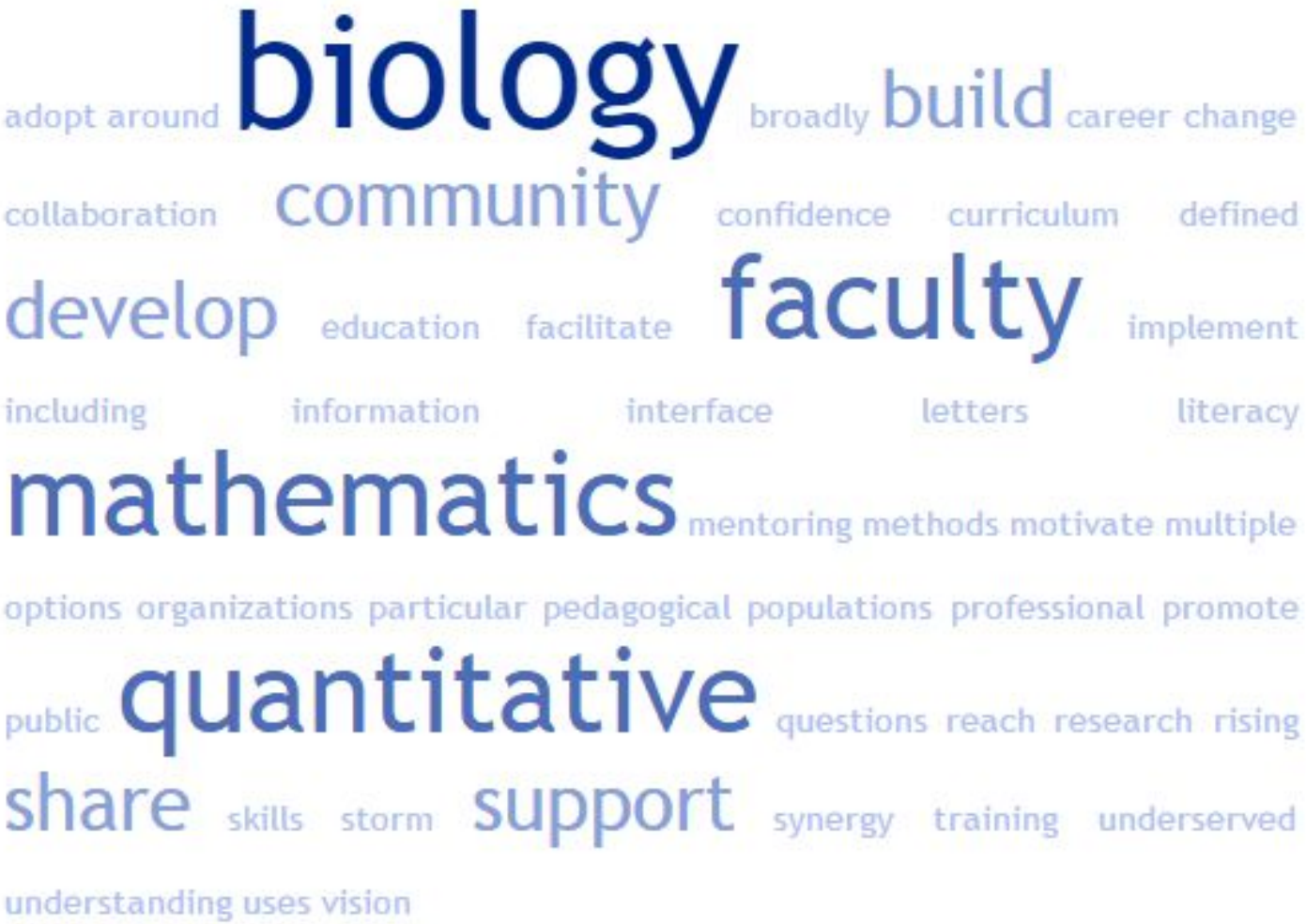




QUBES
The Power of Biology × Math × Community

Eaton and Highlander (2017) *CBE-LSE*

QUBES Supports You



QUBES

The Power of Biology × Math × Community

Join our community

- Get on QUBESHUB.ORG
  - Google single sign-on
  - If you have a project, let us know if you need help developing a group
- Supplement (NISER) to evaluate the site and make improvements so that it is easier to:
  - Find out what others are doing
  - Find what you are looking for (resources, curriculum, etc.)
  - Facilitate conversation
  - Use wishlist to request features!!!

QUBES
The Power of Biology × Math × Community

Thank you!!

NSF grants DBI-1346584, DUE-1446269, 1446284, 1446258, BIO SIGMAA, NIMBioS

Additional Acknowledgements

- <<Advisory Board
- Current postdocs: Arietta Fleming-Davies, Gaby Hamerlinck
- Staff: Hayley Orndorf and Jenny Kwan
- Past postdocs: Alison Hale
- Past involved PIs: Tom Gower, NCSU, Anil Shende and DB Poli, Roanoke College, Bob Sheehy, Radford University, Jennifer Cartier, Unity College, Eung Cho, KY State University