

QUBES-ESA partnership uses online Faculty Mentoring Networks to prepare faculty for teaching quantitative biology to undergraduates

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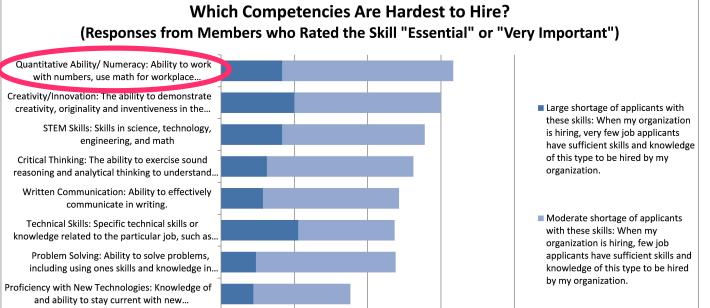


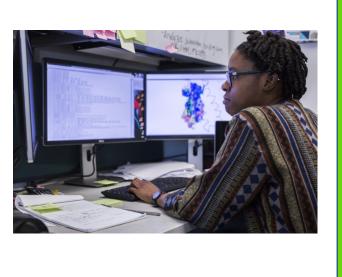
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INTRODUCTION

Quantitative skills such as the ability to analyze and evaluate data sets are important for undergraduates' educational and career success (Vision and Change, 2011).





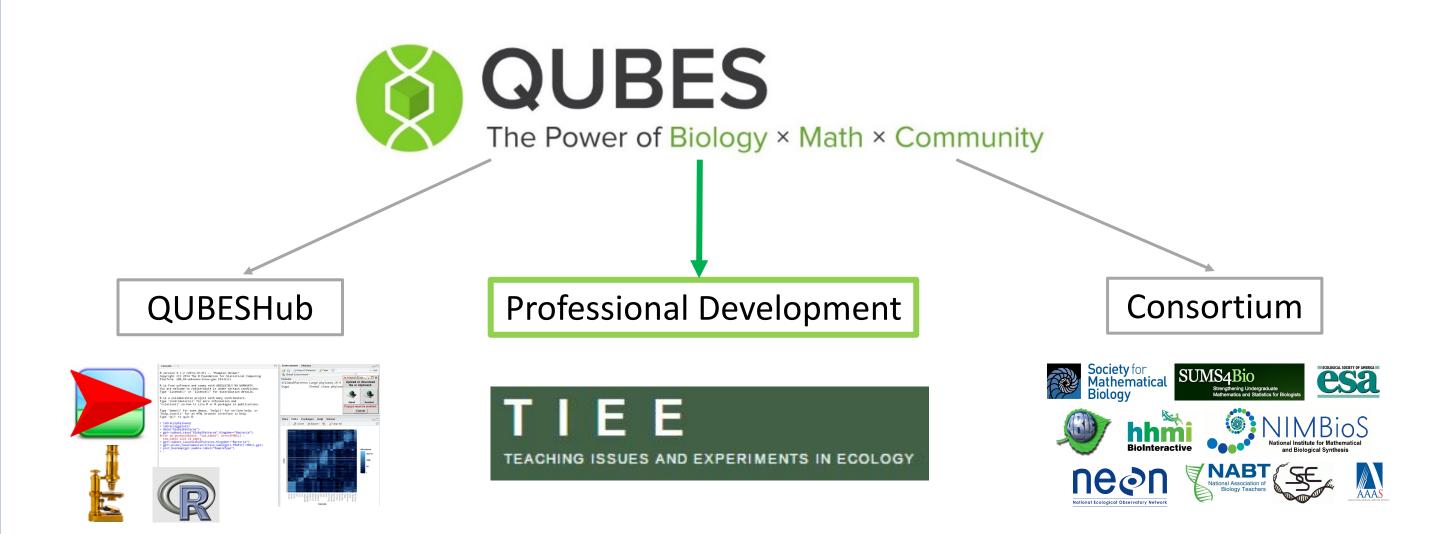


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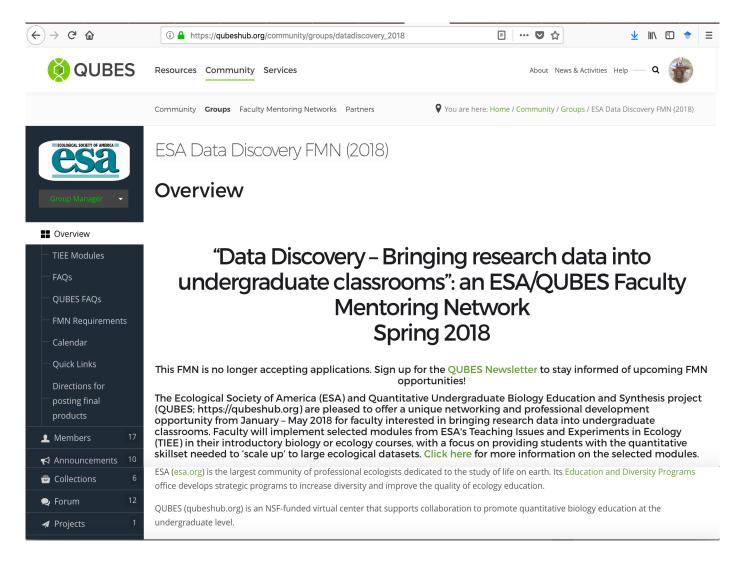
• The rapid development of new analytic methods and availability of datasets means that faculty may require additional training to stay up to date for teaching with these tools.

QUBES

 Quantitative Undergraduate Biology Education and Synthesis (QUBES) is a multifaceted project that supports a community of math and biology educators who share resources and methods for preparing students to use quantitative approaches to tackle real, complex biological problems.



- QUBES uses a virtual center model to serve biology and mathematics faculty and to support collaborations between producers and consumers of educational reform resources.
- Our virtual platform (QUBESHub) facilitates faculty professional development and sharing open educational resources for teaching quantitative skills.



 We promote scholarly teaching practices by scaffolding module implementation, having discussions of evidence based pedagogies, and thoughtful reflection on implementation results, and sharing educational materials with the community.

FACULTY MENTORING NETWORKS

- Faculty mentoring networks (FMNs) are online communities of faculty that support the adaptation and implementation of materials and/or instructional approaches in their classrooms.
- Typically, participants meet biweekly over the course of a semester to discuss module implementation, pedagogical practices, and share educational resources.

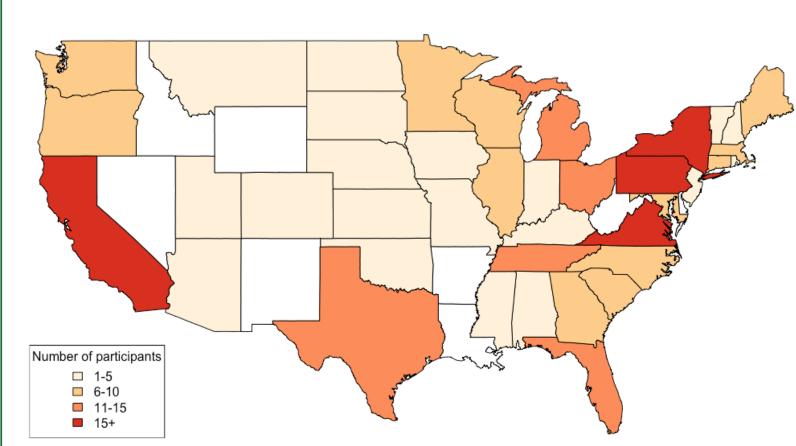


Figure 1: The number and location of QUBES FMN participants from across the United States from 2017 to 2018. There were 24 states (including Hawaii) that had 1-5 participants, 12 states had 6-10 participants, 3 states had 11-15 participants, and 7 states had 15 to 28 participants. We also had 4 participants from Puerto Rico, 3 from Canada and 1 from Turkey.

DATA DISCOVERY FMN

- ESA's Education and Diversity Program Office has partnered with QUBES to collaboratively develop a data-focused Faculty Mentoring Network (FMN).
- Participants that complete the FMN requirements earn the ESA Education Scholars title.
- "Data Discovery" prepares faculty to work with large-scale datasets using datarich teaching materials from Teaching Issues and Experiments in Ecology (TIEE).

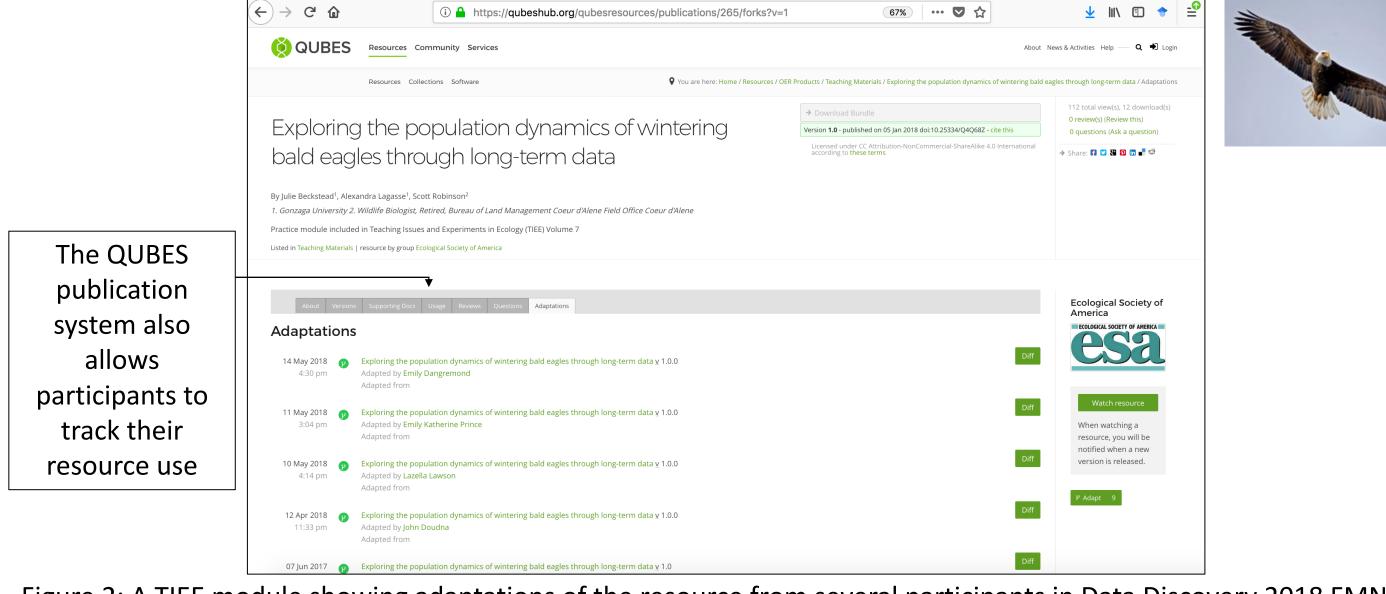


Figure 2: A TIEE module showing adaptations of the resource from several participants in Data Discovery 2018 FMN.

Adaptations of these teaching materials developed during our FMNs are shared with the broader education community.

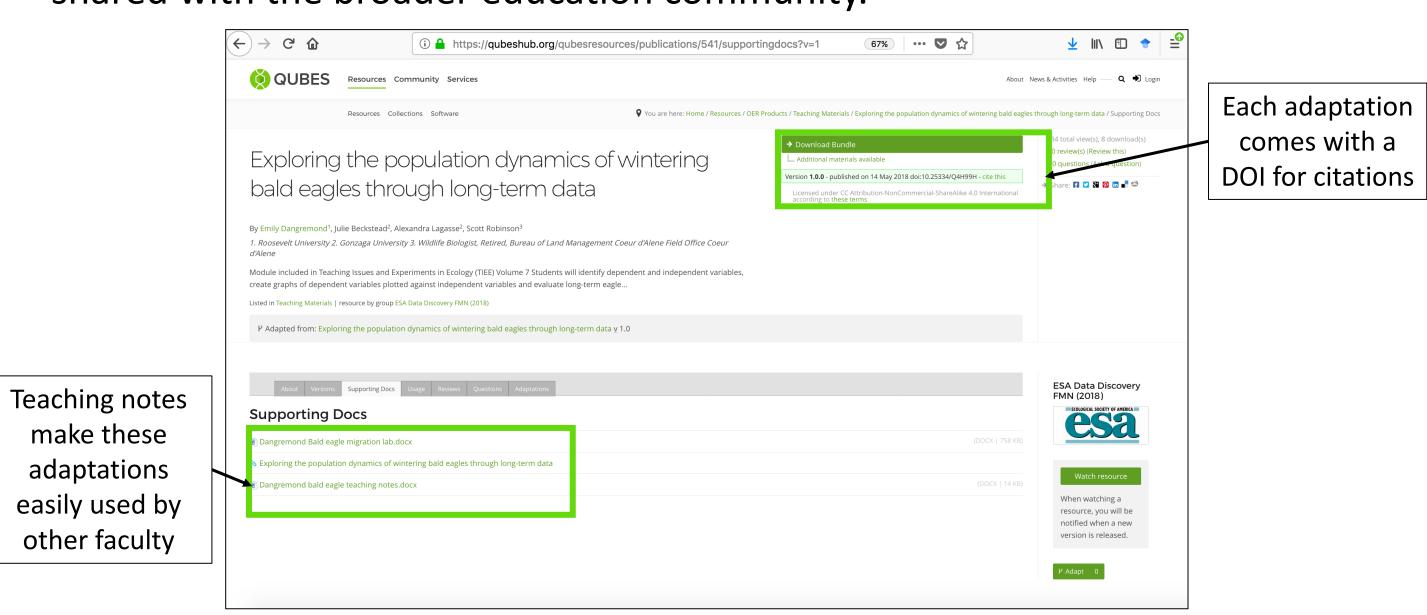
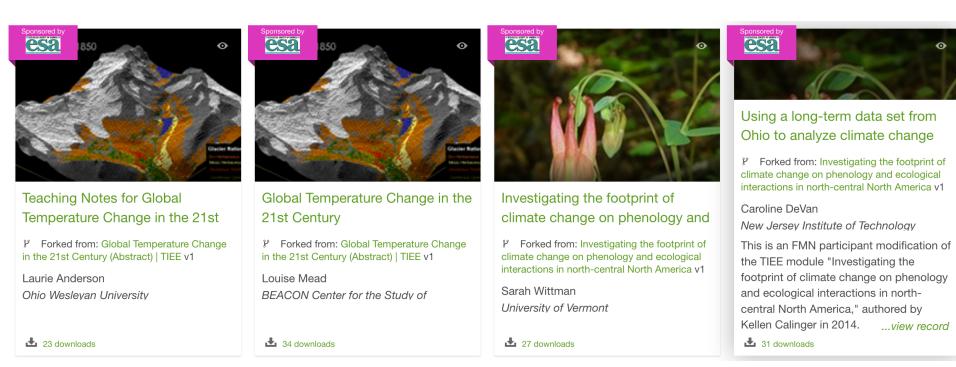


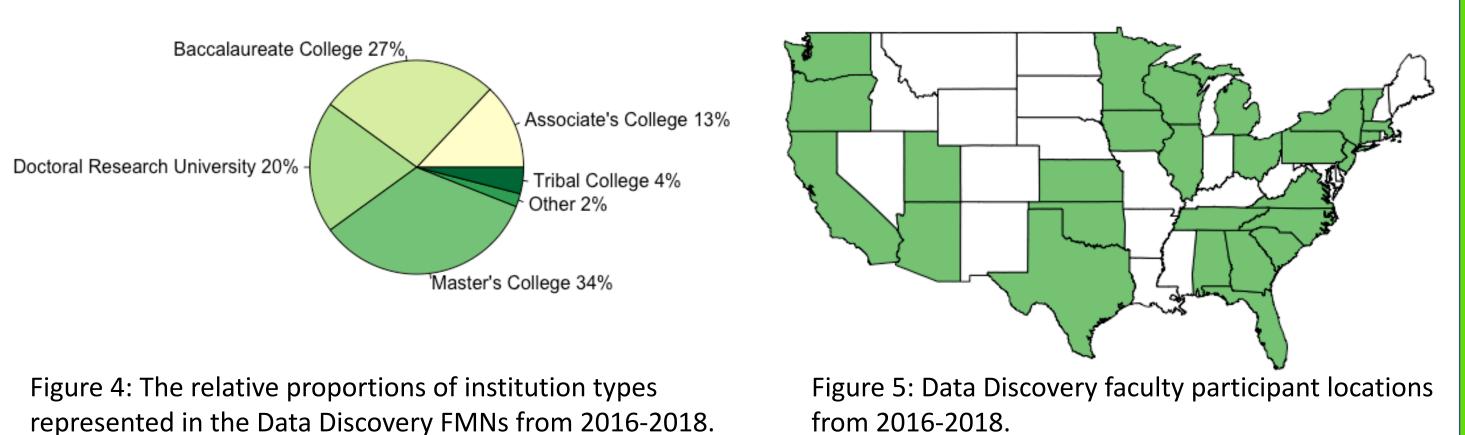
Figure 3: An adapted TIEE module showing files of the adaptations and teaching notes for implementing the module.

RESULTS

• The "Data Discovery" FMN has gone through four iterations since Spring 2016 and has generated 66 final products (adaptations of existing TIEE resources).



• The 56 faculty participants spanned 51 colleges throughout the United States and Puerto Rico (Research universities= 20% (11/55), PUI= 67% (37/55), 2-year= 13% (7/55)) (Figures 4 and 5).



OPEN EDUCATION PRACTICES

- Open Education Practices (OEP) fosters scholarly teaching by providing access to infrastructure where faculty can find, customize, and share high quality teaching resources and strategies.
- Having several options for how to approach a single lesson should multiply the
 potential value of the original TIEE resource faculty may more easily find a
 version they can implement given their unique classroom situation.
- Faculty are often not comfortable sharing resources; however, our FMN participants felt more comfortable sharing their resources and teaching materials after the FMN (Figures 6A, 6B, and 6C).

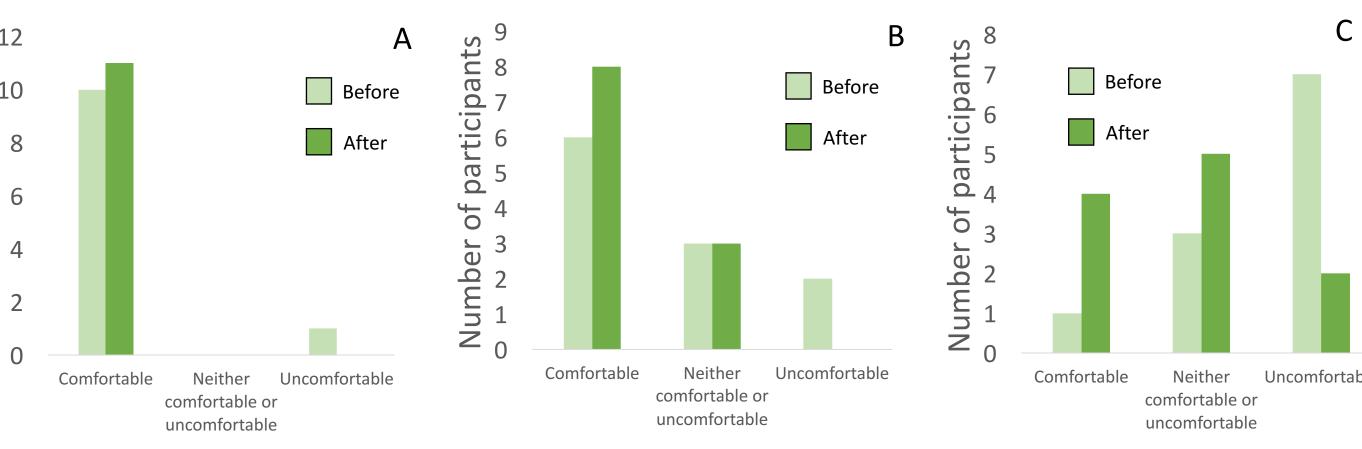


Figure 6: FMN participants' level of comfort sharing educational materials with A) a colleague B) in a small group (like an FMN) or C) to a broader online community, before and after participation in an FMN during 2018.

DISCUSSION

- QUBES FMNs allowed faculty to engage in a professional development opportunity that resulted in authentic, data focused lessons for their classroom with minimal time and financial investments.
- This successful partnership with ESA has provided students with the opportunity to apply quantitative skills to real-world datasets.

Acknowledgements: This material is based upon work supported by the National Science Foundation under DBI 1346584, DUE 1446269, DUE 1446258, and DUE 1446284. Any opin findings, and conclusions or recommendations expressed in this material are those of the author(s) and do not necessarily reflect the views of the National Science Foundation.