



Confronting the challenges of bringing research data into undergraduate classrooms using online faculty mentoring networks

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Motivation

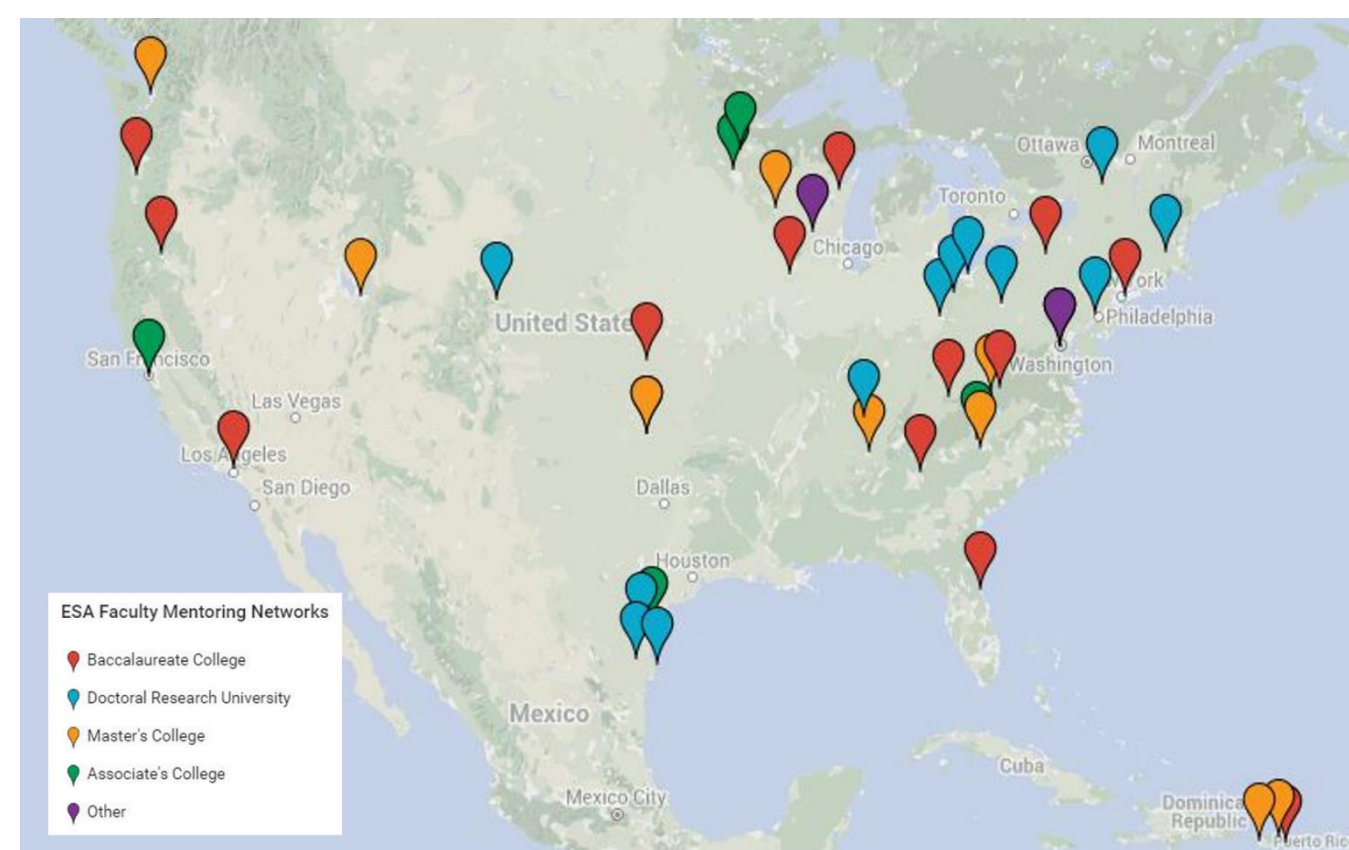
Using ecological research data in undergraduate courses has many potential benefits for student learning. Students gain knowledge of ecological concepts, increased understanding of the scientific process, and meaningful opportunities to develop and practice quantitative skills (Langen et al. 2014). As ecological datasets continue to become larger and more complex, faculty may need additional support both to build their own skills and to teach effectively with research data.



The Ecological Society of America has partnered with the NSF-funded virtual center Quantitative Undergraduate Biology Education and Synthesis (QUBES). This project was funded by the NSF to prepare faculty to use data anticipated from the National Ecological Observatory Network (NEON) in undergraduate education and to diversify faculty and institutions involved in NEON science and education.

Faculty mentoring networks

- Faculty mentoring networks are online groups of faculty members led by expert content mentors, peer mentors, and QUBES liaisons
- Two parallel nationwide mentoring networks from January-May 2016
- “Data Discovery” network was online only
- “Scaling Up” network had online components plus an in-person workshop at the Life Discovery Conference on biology education
- Participants were recognized as ESA Education Scholars



Twenty-eight faculty participants came from 25 institutions across the U.S., and included seven faculty who are underrepresented minorities in science, 21 from primarily undergraduate institutions, six from community colleges, and nine from historically black or minority-serving institutions. Map created by H. Orndorf.



Participants in the “Scaling Up” mentoring network work together at the Life Discovery Conference in Baltimore, March 2016.

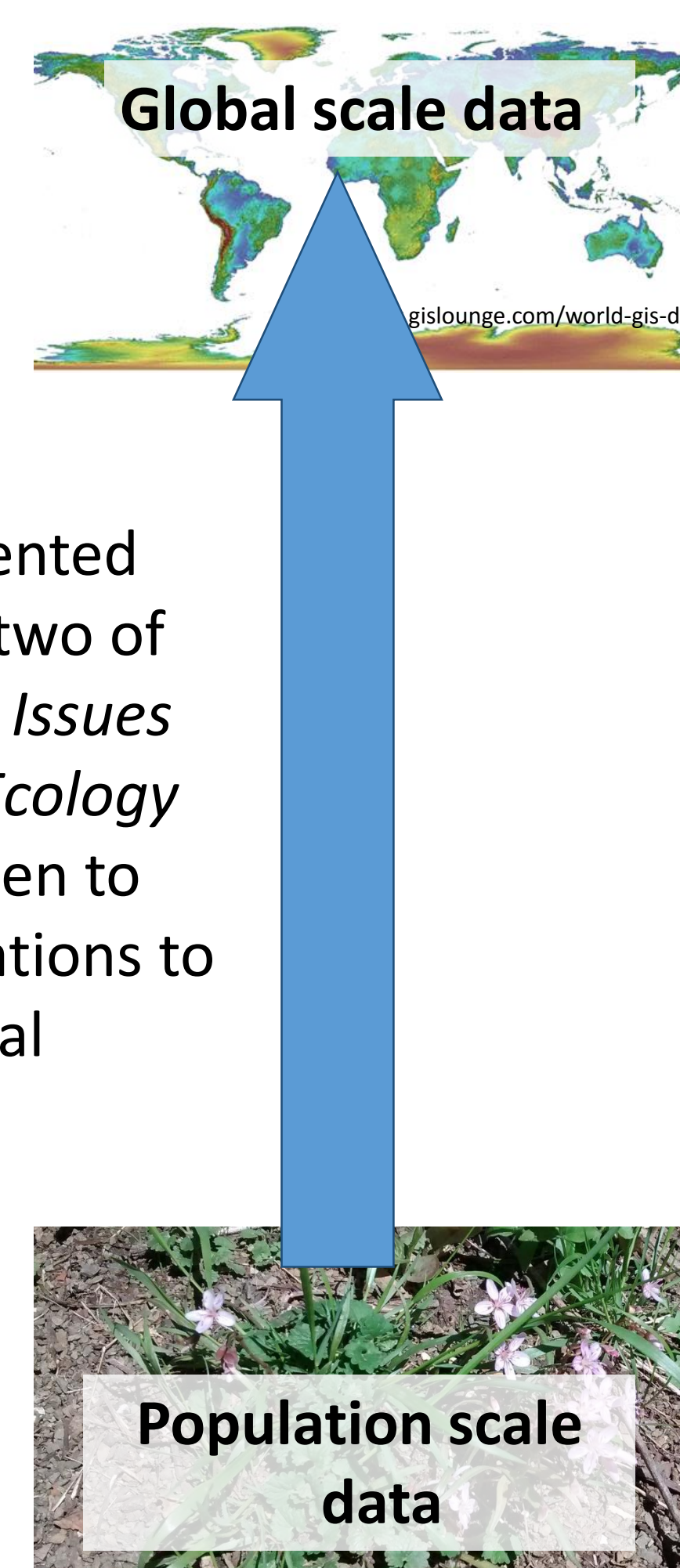
“All of these resources, the advice from faculty in my network, and my previous experience teaching some of these skills, greatly increased my confidence to teach quantitative reasoning skills in a course with freshmen.”

~Faculty participant



Focal materials

Participants implemented and adapted one or two of seven focal *Teaching Issues and Experiments in Ecology* (TIEE) modules, chosen to scale up from populations to communities to global ecosystems



Global temperature change
(Taub & Graham 2011)

Lake ice and global change
(Bohannan et al. 2005)

Avian local species richness
(Langen 2012)

Climate change effects on phenology
(Calinger 2014)

Population dynamics of bald eagles
(Beckstead et al. 2011)

Cemetery demography
(Lanza 2012)

PVA of a local plant population
(Charney & Record 2013)

TIEE

Check out the original materials at: tiee.esa.org

and related & modified materials at:


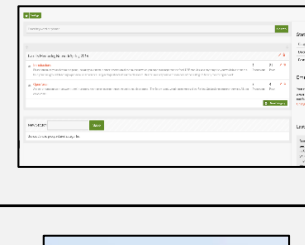
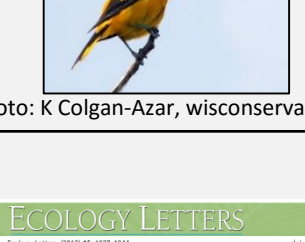
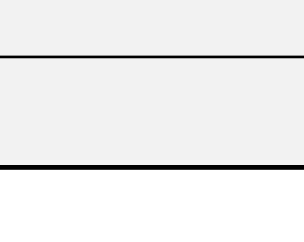
qubeshub.org/groups/esa/collections

What quantitative skills do you hope your students will gain from these materials?

Word cloud made from network participants' responses to this question.

TIEE module spotlight: *Investigating the footprint of climate change on phenology and ecological interactions in north-central North America*, Kellen Calinger (2014)

In Calinger's module, students use long-term climate and flowering time data for plant species from Ohio to investigate the impacts of climate change on plant and animal phenology and diversity. The table highlights just a few of the adaptations participants made to this TIEE module during the faculty mentoring network. Find these at <http://bit.do/qubeshub-esa-phenology>

	Modification/new materials development	Course	Faculty member and institution
	Citizen Science component; students contribute phenology data to Project Budburst	Non-majors General Biology	Patricia Saunders, Ashland University, Ashland, OH
	Adaptation to online course environment; students participate in online discussions	Non-majors Environmental Science (online)	Kristen Genet, Anoka-Ramsey Community College, Coon Rapids, MN
	Citizen Science and connection to local species; students collect data for Campus Migratory Bird Phenology Project	Introductory Biology for majors	Carrie Kissman, St. Norbert College, De Pere, WI
	Connecting data to primary scientific literature; students conduct a literature search	Introductory Biology for majors	Marja Bakermans, Worcester Polytechnic Institute, Worcester, MA

Outcomes

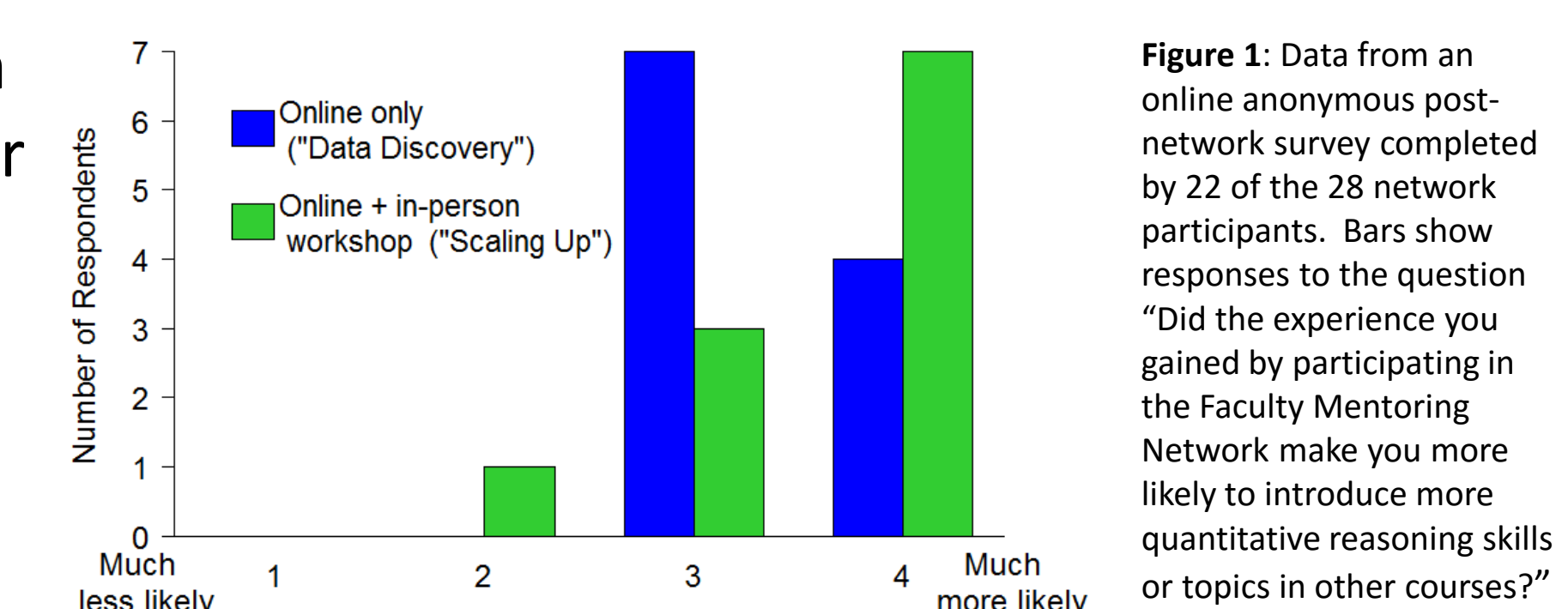
Participants from both “online-only” and “online + in-person workshop” mentoring networks consistently reported that the experience helped them use ecological research data in the undergraduate classroom.

Based on participant reporting of effects on their teaching, online-only mentoring networks might be as effective at helping faculty implement new quantitative materials as networks with an in-person workshop.

Participants reported the most beneficial aspects to be:

- Access to new curriculum materials (18 of 22 respondents)
- Networking with peers (16 of 22 respondents)
- In-person workshop (“Scaling Up” network only; 8 of 11 respondents)

95% of respondents from both networks were “more likely” or “much more likely” to introduce more quantitative reasoning skills or topics in other courses (Figure 1).



Most respondents from both networks would participate in another faculty mentoring network and would recommend them to colleagues (Figures 2 & 3):

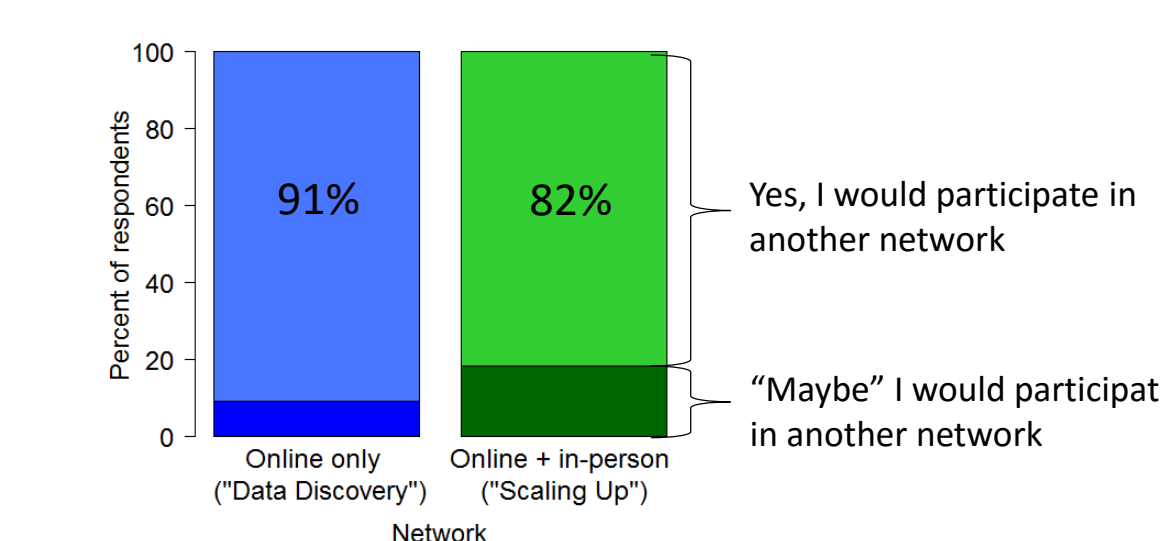


Figure 2: Participant responses to the question “Given your experience in this faculty mentoring network, would you participate in another?” Options were “Yes,” “Maybe,” and “No;” zero respondents chose “No.” See Figure 1 for survey details.

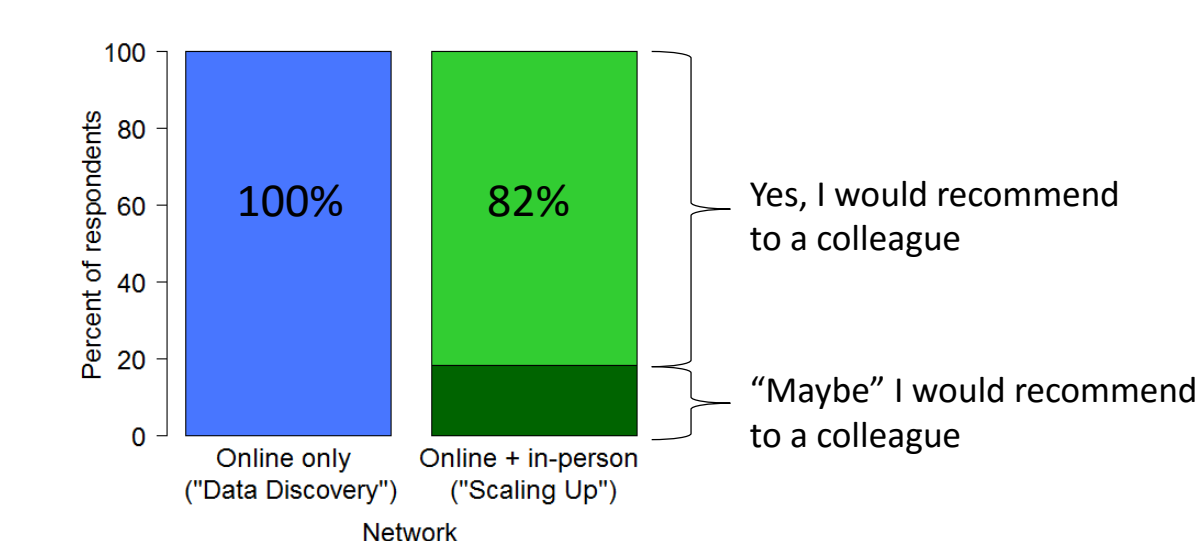
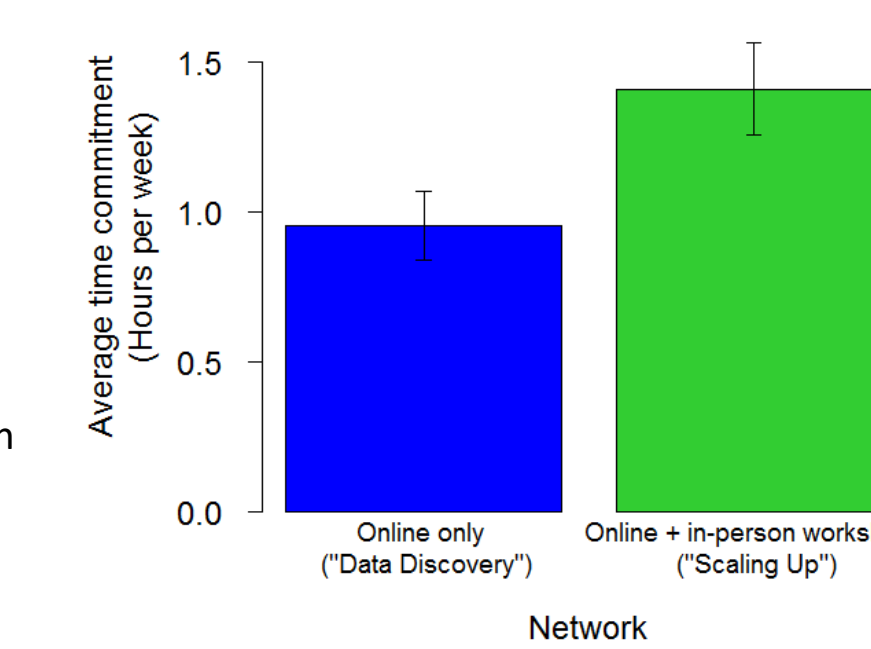


Figure 3: Participant responses to the question “Would you recommend faculty mentoring networks to a colleague?” Options were “Yes,” “Maybe,” and “No;” zero respondents chose “No.” See Figure 1 for survey details.

Figure 4 Average hours per week participants spent on network activities. Error bars show $\pm 1SE$. There was a non-significant trend towards higher time commitment in the network that included an in-person workshop (Wilcoxon test, $W=39$, $P=0.12$). See Figure 1 for survey details.



Participants in the network that included an in-person workshop tended to dedicate slightly more time to network activities (Figure 4).

Both networks generated new use and customization of materials published up to 10 years ago, and documented that activity on the EcoEd Digital Library site. The outcomes of these networks provide evidence that faculty mentoring networks, including those conducted entirely online, are an effective format for promoting teaching scholarship.

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