First Survey, Beginning of Course

Participation

Statement of Informed Consent

You have been asked to complete this survey as part of a research project conducted by Dr. Joseph Holler, a faculty at Middlebury College. The research project is titled "Transforming theory-building and STEM education through reproductions and replications in the geographical sciences" and this survey is designed to assess and inform pedagogical effectiveness.

Your responses are entirely voluntary, and you may refuse to complete any part or all of this survey. Neither your responses nor your participation have any influence on your grade. Your responses are tracked by a random ID number. This survey is confidential, meaning that only Dr. Holler and his research team will be able to link your identity to your responses, and they will keep that information confidential. De-identified responses will be aggregated and shared according to open science standards. By completing and submitting the survey, you affirm that you are at least 18 years old and that you give your consent Dr. Holler and his research team to use your answers in their research.

If you have any questions about this research before or after you complete the survey, please contact Joseph Holler at josephh@middlebury.edu or (802)443-5992. If you have any concerns or questions about your rights as a participant in this research, please contact the Middlebury Institutional Review Board at IRB@middlebury.edu.

Data

1. Please **drag each open and reproducible research practice** to the group which best explains your engagement with the practice.
2. Within the first two groups ("Already Using" or "Aware and Interested"), please **rank the practices in their order of importance**, where #1 is most important.
3. If you are not sure what a particular practice item is, please place it in the "Unaware or Uninterested" group.

Items

Share Data

Version Control (Git)

Research Compendium

Open Source Software

Preregistration

Metadata

Open License

Reproducible Computational Environment

Digital Archive with DOI

Share Methods and Code

Reproduction or Replication Studies

Already Using

Aware and Interested in Using

Unaware or Uninterested

Do you disagree or agree with each of the following statements about **open and reproducible research practices** (ORRP)?

ORRP include any of the items in the previous sorting & ranking question.

	Disagree	Neither agree nor disagree	Agree	Not Applicable
I use ORRP in my academic work	○	○	○	○
I use ORRP in my employed work	○	○	○	○

Do you disagree or agree with each of the following statements about **open and reproducible research practices** (ORRP)?

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	Disagree	Neither agree nor disagree	Agree
There are sufficient resources for facilitating ORRP	○	○	○
ORRP can improve research quality	○	○	○
ORRP can increase research efficiency	○	○	○
I am able to learn ORRP	○	○	○
Using ORRP is enjoyable	○	○	○
ORRP is expected in my field of study/work	○	○	○
I intend to increase my use of ORRP in the future	○	○	○

confidence

Do you disagree or agree with each of the following statements?
"I am confident in my ability to ... "

	Disagree	Neither Agree nor Disagree	Agree
evaluate how appropriate a method is for answering a geographic question	○	○	○
understand the research methods of scientific research papers	○	○	○
improve my understanding of a research paper by reading its associated code	○	○	○
identify geographic sources of uncertainty and bias in scientific papers	○	○	○
evaluate the validity of scientific research papers	○	○	○

Do you disagree or agree with each of the following statements?
"I am confident in my ability to ... "

	Disagree	Neither Agree nor Disagree	Agree
organize and manage complex projects	○	○	○
write interpretations of geographic analysis I have done	○	○	○
communicate geographic research in a way that other people can understand	○	○	○
document geographic methods clearly enough for someone else to repeat them exactly	○	○	○
develop an analysis plan to answer a geographic research question	○	○	○

Do you disagree or agree with each of the following statements?
"I am confident in my ability to ... "

	Disagree	Neither Agree nor Disagree	Agree
participate in the scientific community	○	○	○
learn new geographic research methods on my own	○	○	○
collaborate on scientific research projects	○	○	○
contribute to my peers' learning and academic success	○	○	○
suggest and implement improvements to published scientific research	○	○	○

attitudes

Do you disagree or agree with each of the following statements?

	Disagree	Neither Agree nor Disagree	Agree
I trust the findings of research papers, even if I do not fully understand the methods.	○	○	○
Repeating prior studies and modifying selected study parameters can help to improve scientific knowledge.	○	○	○
It is easy to repeat most scientific studies with the same data and methods and achieve the same results.	○	○	○
The effort to publish a study such that other researchers can repeat the study is worthwhile.	○	○	○
I can benefit personally from repeating the methods and analysis of prior studies.	○	○	○

Demographics

The following questions about you will only be reported in anonymized aggregate form. The responses to the following questions will not be released with study data.

Women, **persons with disabilities**, and three racial and ethnic groups: **Blacks**, **Hispanics**, and **American Indians** or **Alaska Natives** are considered underrepresented in science and engineering. Do you consider yourself a member of any of these groups?

- ○ Yes
- ○ No
- ○ Prefer not to answer

How many courses have you taken of the following types?

Consider "5" to mean "5 or more".

Cartography and other types of data visualization can be considered "quantitative or computational".

	0	1	2	3	4	5
Quantitative or Computational Geography						☐
Other Geography						☐
Other quantitative or computational						☐

How familiar are you with each of these programming languages?

	Not at all	Somewhat	Very
Structured Query Language (SQL)	○	○	○
R	○	○	○
Python	○	○	○

Second Survey, End of Course

Participation

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I am able to learn ORRP	○	○	○
Using ORRP is enjoyable	○	○	○
ORRP is expected in my field of study/work	○	○	○
I intend to increase my use of ORRP in the future	○	○	○

confidence

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"I am confident in my ability to ... "

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understand the research methods of scientific research papers	○	○	○
improve my understanding of a research paper by reading its associated code	○	○	○
identify geographic sources of uncertainty and bias in scientific papers	○	○	○
evaluate the validity of scientific research papers	○	○	○

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write interpretations of geographic analysis I have done	○	○	○
communicate geographic research in a way that other people can understand	○	○	○
document geographic methods clearly enough for someone else to repeat them exactly	○	○	○
develop an analysis plan to answer a geographic research question	○	○	○

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contribute to my peers' learning and academic success	○	○	○
suggest and implement improvements to published scientific research	○	○	○

attitudes

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Repeating prior studies and modifying selected study parameters can help to improve scientific knowledge.	○	○	○
It is easy to repeat most scientific studies with the same data and methods and achieve the same results.	○	○	○
The effort to publish a study such that other researchers can repeat the study is worthwhile.	○	○	○
I can benefit personally from repeating the methods and analysis of prior studies.	○	○	○

feedback

Do you disagree or agree with each of the following statements?

	Disagree	Neither Agree nor Disagree	Agree
I lacked motivation to complete some course requirements	○	○	○
I was not fully engaged with some course elements	○	○	○
Course requirements were too restrictive/ proscribed	○	○	○
The course design was engaging overall	○	○	○
I was motivated by the goals of the course	○	○	○
I asserted independent choices in meeting my course requirements	○	○	○

Which elements of the course design did you find engaging or motivating?
Why?

Which elements of the course design do you think need improvement?
What might make them more engaging and motivational?

Participation

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Although your work is public, you have the option to consent or to decline consent for its inclusion in this research project. If you consent, there is no expectation for anonymity because the work is public. In fact, I am obligated to cite your work explicitly for any quotations or unique intellectual contributions. Your decision to consent or to decline shall not have any impact on your participation or your grade in the course.

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consent_email

Please answer the following consent questions.

	Yes	No
Are you at least 18 years old?	○	○
Do you consent to the use of your public academic work on GitHub.com in this research?	○	○
Do you consent to receive a follow-up survey invitation one year from now?	○	○

I will attempt to follow up with you again in one year.
If there is a better email to use for this follow-up, please enter it below.

Email ${e://Field/RecipientEmail}

Third Survey, one year after course

Participation

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The effort to publish a study such that other researchers can repeat the study is worthwhile.	○	○	○
I can benefit personally from repeating the methods and analysis of prior studies.	○	○	○

impact

Do you disagree or agree with each of the following statements?

	Disagree	Neither Agree nor Disagree	Agree
I spoke about Open GIScience in job interviews.	○	○	○
I have applied skills and lessons from Open GIScience in my work	○	○	○
I have applied skills and lessons from Open GIScience to other courses or independent research	○	○	○

If you have applied skills and lessons from Open GIScience since the course ended, how so?

Have you faced any barriers in applying skills and lessons from Open GIScience after the course?
What were they?