Supplemental Material

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Supplemental Tables and Figures

Supplemental Table 1: List of survey items used to assess instructor views of Ideological Awareness in the classroom. Please see GitHub Repository for full survey and assessment scales.

RQ1. Quantitative Correlative Factors (Applied to RQ2-4)	
Teaching Experience	(1) Approximately how many years have you taught lower division biology courses across your entire academic career? (2) What percentage of the curriculum for your lower division course was developed by you versus being inherited from another instructor? (3) How often do you modify/update your lower division course curriculum, activities, content, etc.? (4) Indicate how comfortable you are with teaching the Ideological Awareness free (i.e. the traditional) biology content in your lower division biology courses.
Teaching Style	(1) It is the role of the instructor to **explicitly link** biological content to social and ethical issues, rather than allowing students to connect biological content to social issues in a more self-directed way. (2) What proportion of each class period is spent lecturing (versus doing activities, eg. iclicker, discussion, group work, presentations, etc).
Classroom Environment	(1) What percentage of students in your lower-division course(s) are PEERs (persons traditionally excluded based on ethnicity or race)? (2) What percentage of your teaching load is comprised of the following types of courses in a typical academic year? Note: Your percentages should add up to 100% in total. (A) lower-level undergraduate classes, (B) upper-level undergraduate classes, (C) Graduate student classes. (3) How many students are in the largest lower division biology course you teach? (4) How many students are in the smallest lower division biology course you teach?
Instructor Appointment	(1) How would you classify the institution you are currently at? (mark all that apply) (2) In which US state is your institution located? (3) How long have you been at your current institution? (4) What is the best descriptor of your current academic appointment?
Instructor Identity	(1) What term best describes your gender identity (select all that apply)? (3) What is your race? (4) Were you a first-generation college student*?
RQ2. Why do instructors feel it is important for students to learn science?	
Qualitative	(1) In your view, why is it important for students to learn science?
RQ3. How do instructors value the implementation of Ideological Awareness in biology education, and to what extent are instructors currently implementing Ideological Awareness in the classroom?	
Quantitative	(1) How important is it for students graduating from your institution to have exposure to a scientific curriculum that addresses biases, stereotypes, and assumptions that shape contemporary and historical science? (2) What percentage of each lower division course *should be* dedicated to moral and ideological components of scientific issues? (3) Indicate how comfortable you would be addressing each topic in your lower division biology course. (A) Human genome editing, (B) Unethical experimentation on disadvantaged communities, (C) Eugenics, (D) The ethics of patient medical rights, (E) Disproportionate representation in science, (F) Relationship between evolution and religion, (G) Disparities in access to health care, (H) Environmental racism, (I) Genetic basis of gender identity and sexual orientation, (J) Issues of race, ethnicity, and ancestry. *Used as correlative factor for RQ2 exclusively* (4) "In the lower-division biology courses you teach, how often do you address biases, stereotypes, and assumptions that shape contemporary and historical science?"
Qualitative	(1) What are the benefits of incorporating more ideologically aware resources in your lower division courses?
RQ4. What do instructors report as hesitations associated with teaching Ideological Awareness in biology?	
Qualitative	(1) What do you fear is the worse-case scenario implementing ideologically aware material in your lower division course? (2) You indicated that you never or rarely address biases, stereotypes, and assumptions in your course. Why do you think these topics are rarely addressed in biology classes? OR You indicated that you address biases, stereotypes, and assumptions in the classroom more than 33% of the time. However, we often get responses indicating faculty rarely teach these relationships. Why do you think these topics are rarely addressed in biology courses?

Supplemental Table 2: Summary of qualitative research questions, coders responsible for data, and initial percent agreement based on coding rubric prior to coding to consensus.

Question	Number of Responses	Coders	Percent Agreement
What are the benefits of incorporating more ideologically aware resources in your lower division courses?	97	SE, RK	53.9%
You indicated that you never or rarely address biases, stereotypes, and assumptions in your course. Why do you think these topics are rarely addressed in biology classes?	55	ED, RC	73.5%
You indicated that you address biases, stereotypes, and assumptions in the classroom more than 33% of the time. However, we often get responses indicating faculty rarely teach these relationships. Why do you think these topics are rarely addressed in biology courses?	54	ED, RC	76.2%
In your view, why is it important for students to learn science?	118	JH, AC	75.3%
What do you fear is the worse-case scenario implementing ideologically aware material in your lower division course?	95	AB, TC	82.0%

Supplemental Table 3: Rubrics used in qualitative coding including code category, a description for each, and example student responses. Underlined text in example column indicates the portion of text qualifying the response for the listed coding category.

In your view, why is it important for students to learn science?			
Code	*Total*	*Description*	*Examples*
Understand the World	*n* = 104 88.1%	Understanding how science shapes aspects of their lives understanding the world, promotes open-mindedness; Understand the world around them (informed citizens), science literacy	1. "Teaching students science is important for them to learn about the world around them. It provides practical knowledge of how to evaluate resources and use critical thinking to understand complex phenomenon." 2. "Science is the basis for understanding the world we live in from the very basics of life to modern science and understanding of disease processes."
Build Science Skills	*n* = 46 39.0%	Facilitates scientific inquiry/method/rigorous thinking/critical thinking/evaluation skill building	1. "Critical thinking; interpretation of data and statistics; be better citizens of the world." 2. "Critical thinking, logical reasoning, deeper understanding of the world in which we live"
Combat Misinformation	*n* = 21 17.8%	Goes beyond science skill to specifically mention interpreting misinformation; Discerning fact from fiction/pseudoscience; finding truth in methodical way	1. "Science teaches critical thinking skills, which will help students to navigate a world filled with information (and misinformation)."
Apply Science Skills	*n* = 15 12.7%	As a tool to solve problems, understanding the limitation of science, preventing the misuse, misunderstanding, or misrepresentation of science	1. "Students should approach science as a way of thinking and of understanding the world around them. Science is a way to understand the natural world, and there is a specific philosophy for how we uncover new knowledge about the natural world (i.e., make hypotheses, test them, modify or reject them in light of new data). Students should be able to reason about natural phenomenon because we are part of the natural world - we are living beings that affect other living beings and non-living entities, and other living beings/non-living entities affect us. Understanding how we and other organisms/non-living entities function, and the ways in which we interact with each other, allows us to (hopefully) improve our world, for ourselves and other organisms."
Build Career Foundation	*n* = 15 12.7%	Career preparation, foundation/teaching next generation of scientists and doctors	1. "We live in a scientific world. A student's contributions to society are enhanced by a grasp of scientific principles and knowledge. For

			students wanting to participate in medical or science careers, a solid foundation of science is essential to their effectiveness."
			2. "To gain critical ability in evaluating facts and public controversies on scientific issues. To acquire skills and employment for making contributions to science."
Encourage Excitement	$n = 2$ 1.7%	Science is fun	1. "A) As citizens they will be expected to vote on a variety of issues that will require a basic level of scientific understanding if they are to make rational choices. B) It is a lot of fun."

What are the benefits of incorporating more ideologically aware resources in your lower division courses?

Code		Description	Examples
Increased Engagement & Interest	$n = 25$ 25.8%	Mentions that students are more engaged, more motivated, interested in content, etc. when presented with materials focused on Ideological Awareness	1. "When I have done it, students really are engaged. They realize that some of the things they believed about biology and science and the world aren't really true. They realize that some of what they thought was "science" (like race is biological and there are only two sexes) is not. Some of them have gone on to educate the others around them as well." 2. "Maintaining student interest, motivation, and applicability to their lived experiences"
Awareness of Misconceptions	$n = 24$ 24.7%	Mentions that students become more aware of previously held misconceptions or biases as on going issues	1. "When I have done it, students really are engaged. They realize that some of the things they believed about biology and science and the world aren't really true. They realize that some of what they thought was "science" (like race is biological and there are only two sexes) is not. Some of them have gone on to educate the others around them as well."
Inclusion & Retention of PEERs	$n = 21$ 21.7%	Mentions that students all students (but especially those who identify as PEERs) feel more included, more likely to persist in STEM	1. "It indicates to historically excluded students that they were unfairly excluded and are valued." 2. "I think it allows persons from PEERs groups more connected to the material and it helps involve them in the course material in a meaningful way."
Society & Science Relationship	$n = 19$ 19.6%	Makes clear mention of how Ideological Awareness materials connect science and current societal issues	1. "Perhaps a better understanding of the societal role of science and science education" 2. "It gives context to the problems that exist in our society and encourages students to question power and authority. In many cases, science has been exploitative. It's important for students to learn that so we can avoid making the same mistakes in the future."

Real World Connections	$n = 16$ 16.5%	Mentions that students are able to connect Ideological Awareness to their everyday life	1. "Students will be more broadly educated and will see the relevance of what they are learning in class to their <u>everyday lives</u>"
Give Complete & Honest Picture	$n = 10$ 10.3%	Mentions that the Ideological Awareness materials provide more context or present a complete picture regarding certain concepts	1. "It will allow getting a <u>more holistic understanding</u> of where scientific concepts come from and why science has been dominated by the perspective of white males." 2. "Making STEM fields more inviting; <u>greater intellectual honesty</u>"
Exposure to Diverse Viewpoints	$n = 8$ 8.2%	Mentions that students are exposed to various sides/ perspectives of an issue	1. "<u>VERY beneficial as long as both sides (or more sides) are offered for exposure</u> instead of just the instructors implicit biases. Presenting a single side causes more harm than good." 2. "One benefit is to <u>educate the students on different perspectives</u> and let the students ponder their own feelings on the matter. "
Development of Critical Thinking	$n = 6$ 6.2%	Mentions that students become critical thinkers who can use their knowledge to analyze various policies and claims.	1. "It <u>builds critical ability</u>, especially regarding targeting social policies and claims that are mistakenly presented as being based on science." 2. "A greater sense of inclusion for PEER students may be a benefit, though I sometimes sense that my PEER students feel uncomfortably singled out when they just want to be seen as 'students'. <u>An increase in critical thinking ability</u>."
Interdisciplinary Connections	$n = 6$ 6.2%	Mentions that students are able to connect science content to other disciplines (e.g.- history, humanities, sociology)	1. "These students come to college to learn, but not just biology. I like it when they say, "<u>Oh, i heard about that in another class, but didn't think it connected to biology!</u>" 2. "It shows students how such ideologies trickle into topics they wouldn't off the top of their head think would be excluding or discriminatory. Also <u>relates humanities concepts to science</u> as it is not strictly empirical "
No or Few Benefits	$n = 6$ 6.2%	States that there is no benefit in extensively presenting Ideological Awareness materials. Alternatively, statement could mention that the level of benefit varies depending on the course	1. "<u>None</u>. As long as that is the biggest problem that they do not know anything, I cannot address as main focus to incorporate ideologically charged areas." 2. "Hello? <u>All I care about is that they understand how signal transduction and gene transcription are controlled because if they don't they will fail in their upper-division classes. I am not interested in teaching sociology or history.</u> My classes are 40% POC and my goal is to get them into good-paying healthcare jobs. I button-hole the brightest and direct them towards careers paths they didn't think were

			open to them. If you think they would be better served by my talking about Henrietta Lacks, you are wrong."
Improved Environment & Dialogue	*n* = 4 4.1%	Mentions that classroom environment is more welcoming with increased rapport between students and instructors	1. "It is more honest and more comprehensive, and the students know this. It helps build rapport and trust between me and the students. It helps the students trust me more, and perceive me as honest and as caring about them." 2. "It can change the way that students think about biology and all courses. It can potentially create a better classroom environment for students form marginalized groups."

What do you fear is the worse-case scenario implementing ideologically aware material in your lower division course?
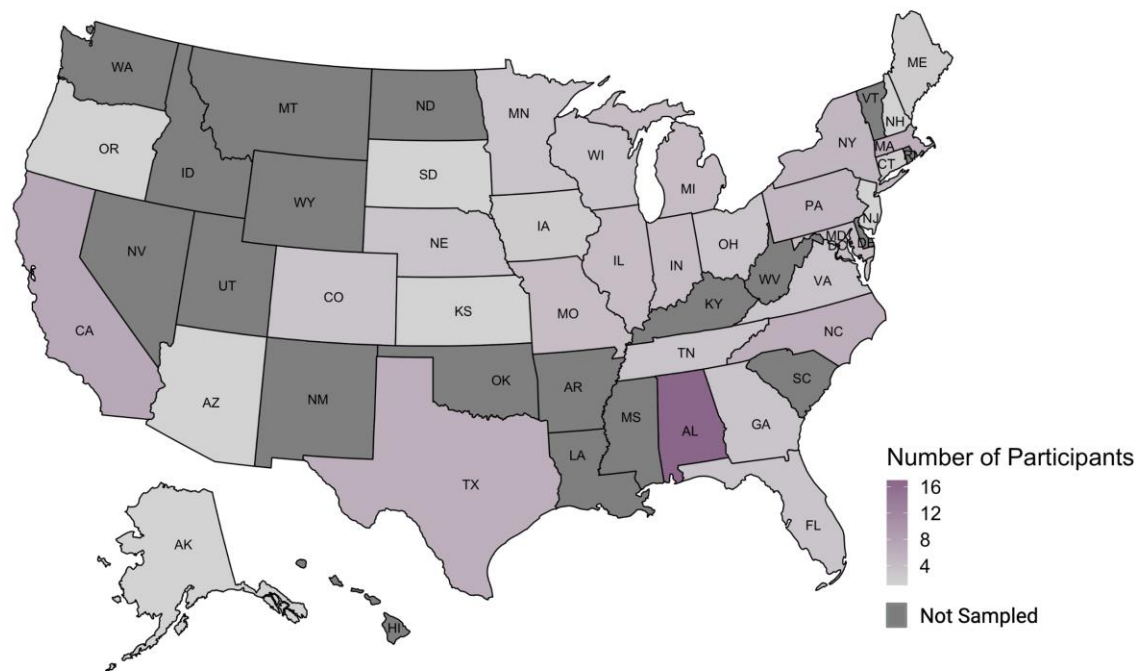
Code		*Description*	*Examples*
Poor Implementation	*n* = 23 24.2%	Includes being biased or wrong, not knowing how to handle issues	1. "Students challenging me on topics that I do not have a thorough understanding of" 2. "I am always afraid that I will 'get it wrong,' i.e. bungle the content because of my own positionality or lack or experience; That professors will do more harm than good, because they are not trained in inclusive pedagogy, or they are unaware of their own biases."
Pushback from People of Power	*n* = 19 20.0%	Pushback from colleagues, supervisors, administration, or leadership	1. "Backlash from other faculty." 2. "Admin pushback, I get fired."
Takes Away from Course Content	*n* = 19 20.0%	It will be distracting/ muddying science content/ take away from course content	1. "Will distract course and prevent from teaching other necessary material." 2. "There is a tremendous amount of information and many concepts they need to learn during Freshman year in order to get a good start and excel in college. The worst-case scenario is they don't learn this material, do poorly, and complete college without the skills necessary to succeed."
Student Alienation	*n* = 14 14.7%	Having students be left out, persecution of students, stereotype threat	1. "Alienating some students." 2. "I don't want science to threaten a student's identity. I don't want them leaving my class thinking that their values are wrong because science says so."
Distort Scientific Objectivity	*n* = 10 10.5%	Reports of lessons being too political, or views of student indoctrination	1. "It would undermine students' faith in the objective nature of science - that the goal we strive to achieve even when we fall short. Politicizing science leads to atrocities from both the left and the right, and is antithetical to the ideas of scientific (rationale) discuss and exploration." 2. "Pushback in regards to some individuals' views that science should

			be politically neutral, especially with the current attitudes towards 'critical race theory'."
Student Discomfort	*n* = 10 10.5%	Students may be unresponsive, checked-out, or unengaged	1. "Lack of student participation and Lack of student engagement with the course material." 2. "An all-too-likely scenario is that my students silently 'check out', assuming that I am biased, willing to put 'ideology' over sound education."
Student Complaints	*n* = 9 9.5%	Student evaluations, drop course, student 'pushback' only, dropping the course	1. "That the students will not be receptive, and that they will complain about the material." 2. "Students dropping the course"
Confrontational Student Response	*n* = 8 8.4%	Physical or verbal confrontations, disrespectful students	1. "Worst case scenario someone responds in a very aggressive, confrontational, and disrespectful manner in the class and causes a physical altercation." 2. "My worst fear would be that students would call out other students in a purposeful and hurtful way."
No Reported Fears	*n* = 7 7.4%	Instructors explicitly state that there are no fears to report, or no negative consequences of implementation	1. "I honestly don't have a particular fear about this. Some students might not like it, but that's OK -- those are probably the students that need to learn it most." 2. "There are no negative consequences of that. Science is a self-correcting process, and one is supposed to change their mind when presented with evidence."
Public Backlash	*n* = 5 5.3%	Outside of university, virtual confrontation, social media or news outlets	1. "Some student gets pissed off, posts about it on Twitter, a firestorm ensues, and I end up dead in a ditch." 2. "I become a headline in the Washington Post."
Student Misunderstanding	*n* = 4 4.2%	Students would get the wrong idea despite correct teaching	1. "Construing of any such discussions as offensive/racist. Some people react to ANY discussion of certain issues as an affront. I have had students react to the taxonomic term "subspecies" as being an offensive term indicating racial inferiority (even if not in any human context!)."
Legal Repercussion	*n* = 1 1.0%	Legal repercussion including lawyers, lawsuits, or trials	1. "Truly worst case - offending a student badly enough that we're talking lawyers…"

You indicated that you never or rarely address biases, stereotypes, and assumptions in your course. Why do you think these topics are rarely addressed in biology classes?

Code		*Description*	*Examples*
Disciplinary Content Disconnect	*n* = 15 27.3%	Instructors think the Ideological Awareness topics are not related to the course content due to biological system differences (e.g. a plant pathologist would not talk about gender identity). Additionally,	1. "I find it difficult to connect the content I teach in lower division courses to these issues. I teach lab courses that primarily hone students' observational skills.; thought to belong in social science rather than science classes"

		instructors believe Ideological Awareness topics belong in social science classes rather than in their science classes. This code includes language labeling science as objective and Ideological Awareness topics as subjective. Basically, overall, The content is not related.	
Lack of Experience	$n = 11$ 20.0%	Instructors feel poorly prepared to teach these topics.	1. "I think these topics are rarely addressed due to lack of education on the subject. I started addressing systematic racism in the classroom as I learned more about it. When I first heard of racist curriculum, I thought biology was exempt. As I learned, I realized how deeply ingrained it is. The first topic I broached as an instructor was the white-centered concept of lactose tolerance. I received so much positive feedback that I started incorporating more. " 2. "Further, it can be intimidating to bring up these issues with a class. If student evaluations strongly influence tenure and promotion it can be very tempting to side step potentially controversial subjects."
Time or Content Restraints	$n = 10$ 18.2%	Certain content is considered more important to be covered in the course, so instructors did not cover these additional topics due to a lack of time in the course. Instructor decisions to not teach Ideological Awareness topics are not due to lack of individual freedom to teach how they want. Basically, they think they don't have the time to teach it because they would have to replace content that is valuable.	1. "Time. The content of the course is always pressing and the foundational courses set the stage for the next set of courses."
Feels Students are not Ready	$n = 9$ 16.4%	Instructors think Ideological Awareness is not appropriate for lower-level science classes because student's do not yet have enough science background to fully understand these topics Instructors mentioned these topics are not covered by the textbooks OR Instructors mentioned they do not have the resources, including time, to create curriculum integrating these topics.	1. "I think for most people at this level of education they can't fully appreciate or comprehend these topics as they don't have enough scientific background knowledge. Additionally, there isn't really enough time to cover these topics and they are only partially related to fundamental biological knowledge."
Pushback	$n = 7$ 12.7%	Instructors fear teaching these topics will result direct negative	1. "Fear of student/parent/admin push back; If they raise the ire of students

		consequences such as poor teacher evaluations from their students, being either fired or not re-hired by administration. Instructors also fear classroom discord as a results of teaching these topics.		or supervisors, it could end a career; students are ideologically driven to 'take sides'."
Lack of Resources	$n = 4$ 7.3%	Instructors mentioned these topics are not covered by the textbooks OR Instructors mentioned they do not have the resources, including time, to create curriculum integrating these topics.	1.	"I think that faculty don't always know HOW to approach these topics in their classes. I think faculty today, especially younger faculty, are generally willing to teach these topics. It's more a matter of having knowledge and resources to integrate these topics with content, and to manage any possible discussion between/among instructors and students to be respectful and compassionate about sensitive topics. Some faculty may not address these topics because they are worried about "sacrificing content," but if they have support for making connections between these topics and typical content, it could increase buy-in for teaching these topics."
Uncomfortable with Topics	$n = 3$ 5.5%	Anyone, including the instructor or their students, is uncomfortable with the topics.	1.	"Some have a social stigma and/or just feel uncomfortable since many of us have no training in these topics."
Cookie Cutter Restraints	$n = 3$ 5.5%	Instructor is supposed to teach exactly what was decided upon by higher ups. The individual instructor does not have the freedom to change any of the curriculum.	1.	"I am a graduate student instructor and have no control over the curriculum I teach. When I have brought this topic up with the instructors of record they have not been open to my suggestions."
Not Aware of Biases & Privilege	$n = 2$ 3.6%	Instructors may be totally unaware of these Ideological Awareness topics due to their privilege.	1.	"Most STEM faculty are of the dominant gender (male), race/ethnicity (white) and socioeconomic status (middle to upper class, educated), making it less probable that they have experienced the type of bias that negatively affects people from marginalized groups. Also, science as taught in my generation didn't address issues of bias, except perhaps (and only a little bit) the contributions of women in science."
Tradition	$n = 1$ 1.8%	Instructors mention they teach a certain way because it has always been taught that way.	1.	"I think first that these topics aren't traditionally taught, and tradition is powerful. I don't think it's because there's a reluctance."

Distribution of Survey Participants by State.

Supplemental Figure 1: Geographical distribution of instructor participants by state. States with no participants are represented in dark gray. Density of participants is represented through color density, and can be determined using the scaled legend.