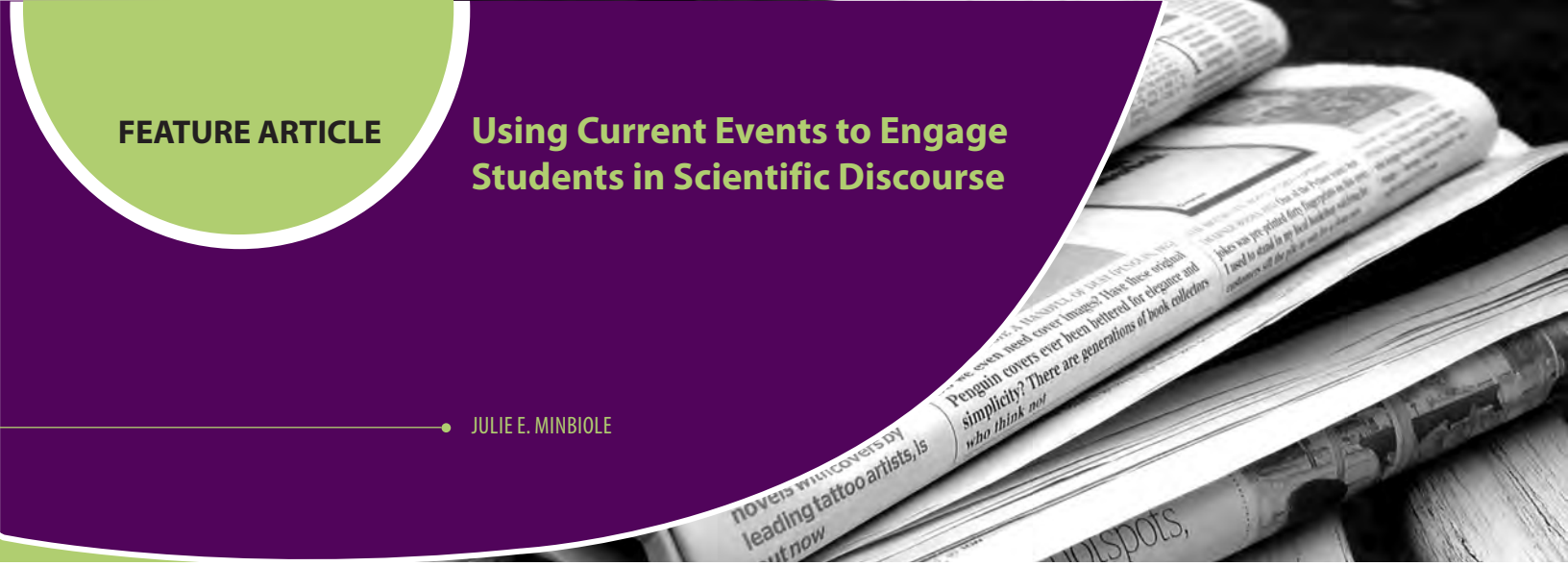
FEATURE ARTICLE

Using Current Events to Engage Students in Scientific Discourse



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Abstract

Instructors from K–16 incorporate current events and contemporary media in their courses in a variety of ways and with different educational objectives. Here, I present strategies for selecting and framing current events in high school and undergraduate biology courses and an example assignment, all explicitly tied to science practice skills and utilizing coursework to advance students' science literacy and participation in the discourse. In this way, current events activities become a core part of the course experience, rather than an "extra" investment of planning and course time requiring trade-offs of instructional time devoted to other topics.

Keywords: *instructional strategies; science literacy; culturally relevant pedagogy (CRP); diversity equity and inclusion (DEI); current events; science practice.*

○ Introduction

The current sociopolitical climate in the United States and abroad has been fueled in part by the rise of social media as a source of news for large portions of the public. In 2019, the Pew Research Foundation found that 52% of Americans surveyed used social media as a frequent source of news information (Shearer & Grieco, 2019). Large portions of information shared online are misinformation or worse; the lack of quality control for online information has led to terms such as "fake news" and the "post-truth society" (Osborne et al., 2022). This raises a new and urgent problem: students need to be critical consumers of scientific information in contemporary media, and our courses may be the last opportunity some of them have to hone the skills to do so. This paper gives an overview of the challenges facing instructors in supporting their high school and undergraduate students in becoming critical consumers of science content in contemporary media. Here, I lay out low time-investment routines I use in my courses—taking as little as 15 minutes per week—to help students engage meaningfully with current events in popular media that also focus on student science practice. These routines align with the principles of Culturally Relevant Pedagogy (CRP), advance course goals of deepening students' understanding of science practices, and cultivate vital skills for civic responsibility by supporting students to become critical consumers of science in their everyday lives.

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Scholars across scientific and social science disciplines have recognized increasing challenges due to the prevalence of misinformation and disinformation in the popular discourse (Bennett & Livingston, 2018; Lecheler & Egelhofer, 2022; Scheufele & Krause, 2019; Tsfati et al., 2020). In 2022, Jonathan Osborne convened a group of scientists and science educators to discuss the challenges that misinformation poses to science education. The group framed this problem in the context of the increasing breadth and complexity of scientific knowledge: "science education has historically played a role in introducing students to domain-specific science ideas, it is simply not possible to introduce all the ideas that young people will need for the rest of their lives" (Osborne et al., 2022). This raises a question, as posed by Osborne, "in [this] context, what knowledge would be of general and enduring value? … [I]t is the knowledge required to evaluate the credibility of a source." The activities described below are rooted in the goal of helping students become more sophisticated and critical as they engage with a variety of media forms.

Many biology instructors strive to incorporate current events and popular media into their course curricula, with varying goals and success. Current events have been used to bring contemporary relevance to learning centered around the scientific method (Palmer & Mahan, 2013) as well as to support active learning experiences, such as using the 2014 Ebola outbreak as a case study (Darwiche & Bokor, 2016). Since the publication of the National Research Council (NRC) *Framework K-12 Science Education* in 2012, middle and

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high school science teachers in particular have been asked to make authentic science practices integral to their courses. Between the core domain-level content of a particular science course, instructional time devoted to science practices, and more recently, differentiation and remediation for students who have experienced interruptions in their in-person science coursework since 2020, the addition of current events routines might seem like a luxury that many instructors lack the instructional time to execute.

I have found incorporating current events into my instruction important in myriad ways, but I am certainly not alone. The NRC Framework's Science Practices 6, 7, and 8 and Vision & Change Core Competencies 4, 5, and 6 all deal with communicating effectively about science and critically analyzing the intersection of science and society (see Table 1). The Science and Mathematics department at my institution views this critical skill worthy of its own departmental learning outcome: "Science outcome 2: *Upon successful completion of science courses, students should be able to discover, evaluate, and assess the credibility of general interest publications related to the scientific subjects they study.*" This outcome is common to all science courses in our department in order to support students

Table 1. Science and Engineering Practices—Descriptions adapted from (NRC, 2012), cross-walked to Vision & Change Core Competencies (Brewer & Smith, 2009). The discussion prompts here are a representative sampling of common prompts in my classes. We typically use 1–3 of these prompts to focus a typical article discussion on particular practice(s) most pertinent to that article and manage our limited class time.

Science & Engineering Practice	**Short Description *with potential prompts in current events discussion***
1. Asking questions (for science) and defining problems (for engineering) [V&C Competency 1: Ability to apply the process of science]	Scientists ask questions such as the following: • "What exists/what happens?" • "Why does it happen?" • "How do we know?" *Class discussion prompts:* • *"What were they trying to figure out?"* • *"What did they learn?"* • *"Why is this important / how does it relate to us?"*
2. Developing and using models [V&C Competency 3: Ability to use modeling & simulation]	Scientists construct mental (internal) and conceptual (explicit) models of phenomena. *Class discussion prompts:* • *"How does this relate to what we know about X?"* • *"Does this change the way you think about X?"*
3. Planning and carrying out investigations [V&C Competency 1: Ability to apply the process of science]	Scientists investigate the world with…two goals: (1) to systematically describe the world and (2) to develop and test theories of how the world works. *Class discussion prompts:* • *"How did the researchers test X?"* • *"How did they figure this out?"* • *"What was their hypothesis?"*
4. Analyzing and interpreting data 5. Using mathematics and computational thinking* [V&C Competency 2: Ability to use quantitative reasoning]	Scientists organize and interpret data [with] tables, graphs, and statistical analysis. *Class discussion prompts:* • *"What do we see in this [graph/table]? What does it mean?"* • *"What does this tell us about their data or experiment?"*
6. Constructing explanations (for science) and designing solutions (for engineering) [V&C Competency 4&6: Ability to tap into the interdisciplinary nature of science / understand the relationship between science & society] 7. Engaging in argument from evidence [V&C Competency 5: Ability to communicate & collaborate with other disciplines] 8. Obtaining, evaluating, and communicating information*	Scientists develop explanatory theories based on substantial bodies evidence over long periods of time, and working hypotheses based on observation and experimental evidence. *Class discussion prompts:* • *"Did the researchers deliver what the article title states?"* • *"What might be a better description of their findings?"* • *"What is the claim being made here? What evidence is being presented that this is true?"*

*Practices 4 & 5 (Analyzing & Interpreting Data and Using Mathematics / Computational Thinking) and 6, 7, & 8 (Constructing explanations, Argument from Evidence and Obtaining, evaluating, and communicating information) are combined here for discussion purposes.

becoming more sophisticated and critical as they engage with a variety of media forms in their daily lives. The American Association for the Advancement of Science (AAAS) Communication toolkit recommends "embedding a discussion of science in places where less motivated audiences might discover them accidentally, will help [us] more deeply engage with that audience, which will likely increase the odds of achieving [our] engagement goal. [We] should also consider tactics like removing jargon, and weighing the need for precise language with what is most relevant to [our] audience and will engage them" (AAAS, 2023). In this context, the thoughtful inclusion of discussions of current events and critical media literacy is a timely and socially necessary element to science courses.

Helping students become critical consumers requires helping them overcome two challenges related to access. The first is that developments in scientific knowledge are becoming ever more specialized, and thus scientific journals are becoming less and less readable to the general population (Plavén-Sigray et al., 2017). From 1845 through the 1970s, the journal *Science* was written at a reading level approachable to the average citizen reader similar to most major newspapers; however, the expertise required to read this journal has increased substantially in recent decades (Martin, 2023). As a result, Donald Hayes states "professional science is now largely inaccessible to the general college-educated reader" (Hayes, 2003). Hayes continues, explaining that this phenomenon "increases the public's reliance on intermediaries to select and translate developments in science for us (e.g., the New York Times and Washington Post's science sections)." Osborne describes this shift as science education seeking less to make students "marginal insiders," having a broad smattering of superficial knowledge, and instead supporting students to be "competent outsiders," with a robust understanding of how scientific discourse works. In other words, science has become too specialized to expect citizens to be well-versed in so many fields. Instead, science education should focus on preparing citizens to understand the process of scientific discourse itself. This latter approach allows students to be confident in reading about scientific developments and helps them to exercise judgment grounded in their understanding of the process of science, and in trusting scientific consensus, rather than the contemporary push for people to "do their own research" superficially on the internet.

The second challenge facing students entering into the science discourse is that the classroom structures of many of our courses and institutions are often not designed to include them. Whether a student is a member of a nondominant group, or even simply a non-science major, students are inundated with messages that their life experiences are not relevant to their science coursework (Marosi et al., 2021). Luckily, we have pedagogical tools to address this problem. Gloria Ladson-Billings' framework for CRP includes developing students' critical consciousness by using course material to interrogate students' real-world situations using scientific knowledge (Ladson-Billings, 1995). More recently, Christopher Emdin's 5C reality pedagogy framework makes recommendations for specific classroom structures to support CRP. Among these recommendations are moving from instructor-directed discussion to distribution of responsibility for discussion and learning in the classroom among both instructors and students (Emdin calls this "cosmopolitanism") and the use of colloquial norms (vocabulary and discussion norms) to make class sound the way students talk outside of class in an effort to reduce intellectual disconnects between classroom and students' lived experiences (Emdin's "context") (Emdin, 2012). Further, these principles of CRP have been shown to increase agency and students' identities as science learners.

These challenges can be addressed through manageable classroom routines that are complementary to existing science practice work that students are already doing in our courses, so the use of current events becomes integral to the course and does not take significant time away from other course priorities. Additionally, these routines have been shown to improve student performance in their courses, which is in line with previous work characterizing the link between CRP and student success (Byrd, 2016). In my experience, the increase in student engagement as a result of these routines more than compensates for any course time invested in these activities. This increase in engagement also made me realize why this approach was working better in my classes than previous current events routines. The current events routines discussed in the literature above, as well as my courses early in my career, focused on content-matching between the article and course material. These routines are more interested in student science practices and the development of students' science identities.

○ Design Principles

Based on what I've learned through my class experiences (both successes and struggles), I strive to incorporate current events based on the following, prioritized criteria:

1. *Selecting "current and timely" contemporary media with some connection to specific course topics*. In the past, I have used popular media articles that were several years old, or from primary literature that were of an inaccessible reading level for a general audience, because of a close connection to a current course topic. In practice, these articles often failed to achieve their desired outcome, as evidenced by lackluster student discussion and a reliance on the instructor to explain either the details or the significance. This solidifies the common perception of science being exclusive. Choosing an article that's still in the news models for students that I'm constantly reading to connect my scientific thinking and course-related knowledge to contemporary issues in the world. This also allows the discussion to focus on the practice of science; whether it's evaluating claims or arguments made in the article, thinking about their data and evidence, or making predictions about where work in that field might lead next. Letting go of my preconception of perfect concordance between the article and this week's course topic also puts the responsibility for making the timely connections to course material back in the hands of the students. This shift of responsibility values student voice in classroom discussion, rather than making students passive recipients of the instructor's ideas about article connections to this week's material.
2. *Connection to a science practice (see Table 1)*. Keeping the discussion focused on the connections between the article and course topics, rather than making the article the focus of class itself through an assignment or a case study, allows students to engage and discuss without the pressure of core coursework and assessment. I want students focused on discussing with each other, rather than taking notes on the discussion, or feeling pressure to perform "correctly." These discussions most often support students making arguments from evidence (Table 1, Practice 6), but still frequently include asking scientific questions (Practice 1)

or discussing models (Practice 3). In this way, students are continuing to refine their use of science practice in a low-stakes environment without formal evaluation or grading of their ideas in discussion. I typically start each discussion with two to three of the prompts from Table 1 in mind. For example, some articles have deeper discussions of recent data whereas others are more about the science questions the authors are exploring. As the semester progresses, students tend to internalize these science practice prompts and take more initiative in the discussions.

3. *Readability for a general audience.* The final criterion I consider is the readability of the article in question. This can be roughly quantified by LEX score or Flesch-Kincade Grade Level estimate (Kincaid et al., 1975; Sanders & Stacy, 2023). Flesch-Kincade has been used by a number of newspapers as well as Scientific American, to appropriately level their text to maximize the potential audience that can engage with their articles. For the publications, this means subscriptions, but for me, it means my students' reading levels and amount of advanced scientific knowledge do not have to be a prerequisite to their access to the scientific discourse. My population of students are nonmajors fulfilling liberal arts requirements, so they understandably haven't had the requisite coursework to effectively digest primary source material. Given my student population, the lack of prerequisites for this course, and section size of 24 students, it seems reasonable that these same criteria might work well for high school classes. This may scale well for larger classes by splitting students into smaller discussion groups and having the groups report to the class a particular aspect of the article they found interesting or had questions about. To lower the barrier to entry into discussion, I often use major newspapers such as the New York Times and Washington Post (Lexiles of 1380L and 1350L respectively), as well as magazines such as The Atlantic (1100L) or Scientific American (1300L), or the broadcasters BBC (1300L) and NPR (1210L) ("Lexile & Quantile Tools - Lexile Analyzer," 2023). These publications are typically available through public libraries. Additionally, many of these sources include audio versions of their articles, further broadening access for students.

Most students have read or been exposed to these news sources, so have some comfort and familiarity when engaging with them. These sources offer a digest of the findings with links to the original research, which are definite bonuses when presenting to a general audience and assessing credibility of research presented. For my needs, I do try to prioritize connection to content in class rather than current, "new this week" topics. If there is something that students really want to start class with (I often get requests), I still try to find links—either to prior or even to upcoming course content. Prioritizing students applying or seeing the knowledge they have acquired from class seems to be particularly critical for engaging my nonmajors population. Illustrating the usefulness of the work they are putting into class helps to circumvent the well-documented preconception of "why are we learning this, I'll never use it," often the result of students' prior negative educational experiences. If students are regularly engaging with the news or healthcare in any way, chances are very good they will encounter reference to genetics or science content, and hopefully feel more confident in their ability to understand and/or critically interpret what is being presented (Bae & Lai, 2020; Gasiewski et al., 2012).

○ Application: What This Looks Like in Class

Agency in the Discourse: Building Student Interest and Confidence

Rather than a discrete lesson or case study, in my courses I use an article as an introduction or link to the weekly coursework. This serves to highlight the relevance of the week's topic and the work we will encounter in class. I primarily select content from popular press sources that students have heard of and might encounter on a semi-regular basis. An example of one of my favorite articles of the past couple years is an article in the New York Times: "A New Company With a Wild Mission: Bring Back the Woolly Mammoth" (Zimmer, 2021). While progress updates on this mammoth project have been mentioned in the media as recently as February 27, 2023, I find the readability and background in the 2021 article to be excellent. I do supplement this article by including the most recent news regarding newly secured funding for this ongoing work, but the Zimmer article is superior in providing a more wholistic explanation of the project. I've used this article in various areas of my undergraduate nonmajors genetics course, but my favorite was introducing it when students are working through genotype, phenotype, and genetic determinism. When beginning our routine, students take a few minutes at the beginning of class to read the article and jot some notes on where they see links to course content and questions that arise as they read through.

When students are ready, I take a moment to introduce the article and its source publication. I mention the researchers and the research institution (George Church in this case) and show students what I've found. From there I like to ask students, "Now that we've been working on genetics content for a few weeks, what do you think?" and hand this off for 15 minutes of class discussion. This open-ended question allows students to take the conversation in any direction that is of interest to them. It is often difficult to get students to slow down when we get to discussing current events articles; this one in particular often evokes strong feelings and positions on the content. The bar for my students to talk about a science-related current event has always felt fairly low to me, but I've only recently realized it is because our current events routines offer students multiple entry points into the conversation, depending on their level of interest and confidence in the topic. Still others may not feel comfortable with introducing articles or questions, but they can still offer responses and personal reactions based on their life experience. Additionally, there is often a hook to entice readers in the title or the lede; another great prompt for discussion is for students to debate whether the writers delivered on the promise of their title.

This article was a great opportunity to explore the feasibility of moving genes from one organism to another and bring in common ancestry and universal genetic code, and students' eagerness to discuss the article built engagement for our subsequent coursework on those topics. Students often concluded this mammoth undertaking wouldn't work, which presents an opportunity to have them define why. What about the researcher's process do they feel lacks the feasibility to recreate a viable organism? This gets students thinking about genotype, environmental influence on gene expression, and resulting phenotype. This article also presented an excellent opportunity to have students think about some of the ethical issues that often arise alongside advances in genetic technology—as well as the opportunity to have student voices drive the discussion, so my students feel ownership over their learning, and a sense that they have the ability to discuss contemporary issues in science.

Student Choice and Voice: Popular Press Article Assignment

In my course, the practice of article sourcing and defining links to course material in the article gets handed off to the students when we are a third of the way through the semester. I introduce students to an assignment allowing them to discover an article themselves on a topic in genetics that interests them. I provide them with a rubric (see Supplemental Materials provided with the online version of this article) for the article assignment, and I give them three weeks to complete the work. This gives sufficient time for the students to comb through sources for a topic that interests them and in which they can define links to course content. Some students are invested in a particular topic that is personal or important to them, and depending on the topic students may need assistance in sourcing accessible materials. This three-week timeline allows sufficient cushion to assist students who may need guidance. Having covered several weeks of content, and several rounds of article discussions, students should feel confident and well-equipped to look for relevant current events and identify direct links between the article and course material themselves.

- Student choice is important—they get to follow interest (relates to confidence, motivation & engagement, cultural relevance).
- Student work is significantly better than what I got 10 years ago, which I attribute to the building of discourse skill and confidence in the preceding weekly article discussions.
- Choice means not only choice of topic/content, but choice of reading level/source.

While I include a list of recommended sources for articles (NYTimes, Scientific American, etc.), students are not required to stick with my recommended sites.

This assignment would seem daunting to many of my students at the beginning of the semester (many have made this comment when we look over the syllabus in Week 1), but by mid-semester, this is the next logical step for students as they build on the skills they have practiced in weekly discussion. I take the high quality of popular press assignments turned in as evidence that our weekly discussions are paying dividends for students. Students submit a wide range of articles, a few of which I try to pull for discussion later in the semester if they are a good fit for the week's content.

○ Implementation and Conclusions

There are many reasons to include current events and popular media in a course—if it is to teach core course content, that requires one set of strategies and supports discussed in depth by others (Darwiche & Bokor, 2016; Palmer & Mahan, 2013). The discussions described in this paper, on the other hand, are aimed at improving student engagement, buy-in, and confidence, as well as increasing the relevance of the core course content covered elsewhere (which, in turn, increases student engagement in those tasks). When I started this work, I was not aware of the link between Culturally Relevant Pedagogical practices and improved student outcomes in overall coursework, but these discussion routines have become an integral part of the content and culture in all my courses. Through each semester, students progressively contribute more thoughtful comments or discussion questions for the class, other students suggest news events to me, and some even bring their own findings into class with discussion questions in mind. I have seen marked improvement in student satisfaction and engagement (as shown in course evaluations), and I frequently get comments on course evaluations highlighting connections between course material and everyday life, including the current events discussions in particular.

With my exclusively nonmajors population at an institution with a focus in arts and media, I consistently encounter student confidence and reluctance issues. Nearly every new semester includes a student approaching me at the first class meeting saying "I'm not a science person," or, "I've never been very good at this, I put science off until my senior year—but I need this course to graduate." I have always tried to support my students in developing their science practice and participation and feeling of inclusion in science discourse. At the beginning of my career, I referred to this as "science literacy," but this struck me as an overly passive model for participation in scientific thinking, "a one-way flow of information from the knowledgeable to the less knowledgeable" (Liu, 2009). As I have shifted my class structure to a more active model of participation in the discourse, these weekly current events discussions and the student-selected popular press article assignment have taken on greater importance in building students' analysis and argumentation skills and science identities—important characteristics for a civically responsible person to possess. I have also observed the types of improvements in student confidence and engagement that Ladson-Billings and Emdin predicted.

On looking back through student course evaluations and data collected by our departmental assessment committee, several themes emerged in student comments, summarized in Tables 2 and 3. All anonymous student evaluations from 2020 to 2023, as well as all anonymous assessment committee comments (collected in 2022) that could be identified as my courses (by mentioning course or instructor name) were deductively coded by an instructor at another institution. For inter-coder reliability, this instructor selected four students and blinded the institution and instructor name in comments. Consensus codes were considered any time at least four of the five coders agreed on a code (Bertolino, 2023). Common themes coded here include students' self-reported increase in confidence with science material, a sense that this course was more engaging than their typical course, and specific mentions of discussions of current events or other real-world applications. Additionally coded were positive impressions or personal connection with the instructor, course organization, or discussion of rigor/content. Responses for rigor were neutrally coded (the majority of these praised the rigor/utility of the course, but this also includes comments about the course being "too difficult").

Several common themes appear in the coded data. There were no comments critical of the course organization. Isolated negative comments about particular assignment scores or frustrations about particular course content were omitted as being not representative of students' overall impressions of the course. Forty-six of the 126 student comments specifically mentioned that this course was more engaging than their typical course. The strongest co-incidences of themes were around the current events discussions and high course engagement (14 of 25 students who mentioned the current events discussion also reported high engagement) and improving confidence and course engagement (9 of 16 students mentioned both these themes in the same comment). This concordance between these discussion routines, student confidence, and course engagement suggests that students associated current events discussions with helping them engage with the course and helping improve their confidence.

Table 2. Summary of student perceptions of course outcomes, 2020–2023. The totals below are results of deductively coded data from student course evaluations and departmental assessment data. All responses were voluntary and anonymous, and all coding was completed by individuals from another institution. Theme codes are shown in top section; the bottom section summarizes responses that reported co-incidence between increased engagement and an additional theme.

Response Theme	**Number of Student Response (126 coded)**
Found this class more engaging than other courses	47
Increasing Confidence / overcoming reluctance due to course	16
Value of current events / "real life applications" discussions	25
Praise for instructor / personal connection	51
Course organization supported learning	27
Course was rigorous / content was beneficial	21
Co-incidence of Response Themes	**Number of Responses (subtotal by theme)**
Increasing Confidence + Engagement	(9/16) 56%
Current events / applications + Engagement	(14/25) 56%
Instructor praise + Engagement	(11/51) 22%
Organization + Engagement	(6/27) 23%
Rigor / content + Engagement	(5/21) 24%

Table 3. Student comments regarding current events and perceptions of course performance, 2020–2023. Comments were selected as representative of multiple student responses. All comments were selected by an instructor from another institution and have not been modified except to redact names and shortened with (…).

Category	**Specific Examples from Student Evaluations & Comments**
Praise for Article / Current Events Discussion	[Instructor] is always available to talk about whatever scientific questions that we have on our minds and whatever tangents the course content leads us to. I came into the class knowing a little about a lot of the course material and it was really interesting to go more in-depth on it!
	I have learned so much, although I may not like learning genetics. The outside articles always help connect what I learn here to the rest of the world. Thank you!
	I love all of our discussion topics they are always so interesting to learn about. This class was everything and more that what u expected out of the class.
	[instructor] brought in articles of the week to show us what was happening in the genetics world while we were learning about the topic which I found really vital to my growing interest in genetics.
	We did weekly readings of real world developments in the study of what we were talking about—always interesting and insightful.
	[instructor] makes class relevant by using up to date articles on the material.
Applications & Relevance to Students' Lives	Keep providing outside sources and materials to how what we learn relates to the world, because it is very helpful in my understanding and probably others as well.
	This class inspired my [senior project], and for that I couldn't be more grateful!
	I felt very comfortable in this class! … I rarely felt like I was asking a dumb question. [R]elating what we learned to current events really helped me understand the content of this class and its relevance.
Student Confidence	Before going into the class I was pretty nervous, especially considering this lab would be given over the course of a pandemic. This class has been so much fun this semester… made taking science that much better.
	Science is definitely not my forte, but… [i]t's clear that [instructor] really cares about her students and wants them to excel…. I feel like I have a much better grasp on genetics than I did going into the course, and I'm very glad I took it.

Given that student confidence and science identities can be barriers to my students' success, work that they see as "core course material" (i.e., topics on the syllabus or chapters in the textbook) can often be fraught with confidence issues and students' preconceptions of their own abilities. Discussing and debating the news, on the other hand, is more familiar, and students can connect to their larger reservoir of background knowledge about their daily lives (which leads to confidence) and personal investment (which helps with relevance, motivation, and engagement). The incorporation of these routines has increased student engagement and participation in class and advances the goal of helping students to become literate in science practice and discourse—a set of skills they can take with them long after they leave the course.

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