

# Building Radical Listening and Empathy through an Implementation Lab in an Undergraduate Microbiology Course

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## INTRODUCTION

Science literacy is essential for the collective decision-making that is necessary for the health and well-being of individuals, communities, and society. In the National Academies of Science report, *Science Literacy: Concepts, Contexts, and Consequences*, the definition of science literacy was expanded from basic knowledge of facts to include the ability to engage in discussions and decisions about the values and contributions of science (1). Thus, the communication of scientific concepts to a broad audience is an important skill for undergraduate students to develop. Additionally, as students build their scientific communication skills, they also increase their own scientific literacy by building their confidence in and understanding of course-related subject content (2). For scientists and physicians to effectively communicate and educate, it is crucial to appreciate the cultural, social, and emotional factors that contribute to an individual's understanding. Many times, scientists adhere to the knowledge deficit model, which is based on the premise that increasing knowledge of a topic will result in behavioral and attitude changes (3, 4). This model is considered ineffective, especially surrounding challenging or controversial issues (5–7).

Empathetic science communication provides an alternative to the knowledge deficit model and emphasizes the value and perspective of others as important for productive communication (8). As such, medical schools incorporate empathy exercises into communication training (9, 10). There are increasing efforts to include scientific communication opportunities in the undergraduate curriculum (11–13). To help undergraduate students build a holistic scientific communication methodology centered on the audience, we developed a series of empathy workshops

focused on building active listening skills to communicate across emotion. These tools were applied by students in either an implementation lab or during a service learning project.

The empathy workshops were used in a general microbiology course at the Keck Science Department, which served students from Claremont McKenna, Scripps, and Pitzer Colleges during the Spring 2021 (virtual) and Spring 2022 semesters (in-person). Each class consisted of 21 and 18 students, respectively. The workshops addressed three course learning goals: (i) practicing scientific communication in a written and oral format, (ii) developing and expanding understanding of and capacity for active participation in a community, and (iii) appreciating the relevance of microbiology to the world around us.

## PROCEDURE

### Ethics statement

This work was granted an exemption by the Scripps College Institutional Review Board under exempt category I, Educational Research.

### Module A: vaccine hesitancy

In Spring 2021, the workshop centered around empathically understanding a person's hesitancy around the 2019 coronavirus disease (COVID-19) vaccine. This module consisted of two 75-min classes and one 135-min lab (Table 1). On day 1, we asked students to deeply understand and empathically develop a character who was vaccine hesitant. We centered empathy to encourage a full, compassionate, and nuanced realization of these characters.

We began the day with a quick ice-breaker (see Appendix SA in the supplemental material) to promote community connection and engagement. We then began the module by discussing and defining empathy (Appendix SB). We then asked students to employ empathy as they deeply imagined the perspectives and emotions of a vaccine-hesitant individual. We provided a series of prompts and asked students to journal their responses (Appendix SC) as they began to imagine a character for their

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TABLE I  
Description of empathy workshop modules

Module	Topic	Reflection questions	Learning goal
A, class one	Create a character	<ul style="list-style-type: none"> <li>• What did you learn about the emotional side of vaccine hesitancy?</li> <li>• What did you learn about yourself?</li> </ul>	To deeply imagine and understand the emotions and perspectives of a vaccine hesitant individual
A, class two	Create a methodology	<ul style="list-style-type: none"> <li>• How did it feel to “try on” these tools?</li> <li>• What concepts worked, what might you keep or discard, and what might you add to your methodology?</li> </ul>	To develop tools to actively listen, as well as empathetically and effectively communicate with, friends, family, and patients who may be vaccine hesitant
A, lab	Role play lab	<ul style="list-style-type: none"> <li>• How did this experience feel in each role?</li> <li>• What did you learn about listening and communication through this module?</li> </ul>	Experience a methodology from three sides: in the role of a patient, of a physician, and as an observer
B, class one	Activate listening and “acknowledge”	<ul style="list-style-type: none"> <li>• How did it feel to “acknowledge” another person?</li> <li>• How did it feel to be “acknowledged”?</li> </ul>	Utilize empathy to connect to each other’s personhoods and humanity

lab. To wrap up, we had a brief discussion to reflect on their experiences. We asked students two central questions: What did you learn about the emotional side of vaccine hesitancy from this exercise? What did you learn about yourself from this exercise?

The goal of the second class was to consider the physician or clinician’s role in communicating across emotion. We asked students to build their own unique methodology to promote compassionate, efficient, and effective communication around vaccine information.

We began the day with another quick ice-breaker (Appendix SA). Diving into the module, we began a conversation around the emotional impact on decision-making and offered three tools to communicate across emotion: validate humanity, ask open questions, and share narrative (Appendix SD). We split students into three breakout sessions to practice each tool. To wrap up, we reflected on how it felt to “try on” these tools. We asked students to consider what concepts worked for them, what they might keep or discard, and what they might add to their own methodology.

During our lab (Appendix SE), we asked students to experience these tools from three sides: in the role of a patient, a physician, and as an observer. Over three 15-min sessions, students would cycle through playing the patient (using the character they created on day 1), the physician (using the methodology they created on day 2), and as an observer (to have a more objective understanding of the exchange). Every student had a chance to experience each role once.

### Module B: community engagement

In Spring 2022, a new class of students focused on connecting with the community through a service learning project. Service learning provides an opportunity for students to connect class material to community needs and can prepare students to contribute to a just and equitable society (14, 15). We partnered

with a community action organization and the Pitzer Community Engagement Center to cocreate an outreach program. This module consisted of two 75-min classes (Table I). After the empathy workshop and conversations between students and community members, we collectively identified pressing questions and cocreated informational materials to communicate the microbiology and science underlying areas of interest to the community members, such as vaccination, pre- and probiotics, and composting.

The goal of the first class was to utilize empathy to connect to each other’s personhoods and humanity and to develop comfortability and confidence when communicating across difference, emotion, and lived experience. After our ice-breaker (Appendix SA), we had a group conversation to rearticulate some concerns and anxieties about moving from classroom into community. Topics of interest included imposter syndrome, privilege and privileged platforms, self-consciousness, and navigating difficult conversations. Similar to our first module, we began with a discussion around empathy. Differing from our first module, we next divided students into pairs to work on the skill of “acknowledging,” or the deceptively simple act of demonstrating that you have heard and registered what another person shared with you (Appendix SF). Our second class paralleled our first module, and we adjusted the tools of validating, asking, and sharing to support our community-based project and participants.

### Scalability and application

While a similar collaboration between Biology and Theater departments may prove useful, anyone may apply the exercises in the appendices. Utilizing empathy (Appendix SB) will help to foreground character development (the deep imagining and embodiment of a character) without needing technical knowledge in theater practices. Similarly, presenting clear and focused objectives for each role (patient, physician, and observer) in the lab portion (Appendix SE) will provide a manageable framework for students to successfully experience and execute roleplay.

TABLE 2  
Sample student feedback

<b>Prompt: Reflect on your experiences this semester. What skills have you learned or practiced and how might you apply these in the future?</b>
Student responses
“I think I have also developed a better understanding of how one’s own knowledge, resources, and privilege can be shared and utilized with others.”
“The process of noting information, contextualizing it, and keeping in mind that there is always more to be learned, helped me become more comfortable with the fact that I won’t always know everything, but I can keep learning by asking questions and understanding others’ perspectives. For this reason, I feel that I have also become a better scientist.”
“Another personal quality I developed through this project was openness. There were times when I could not fully relate to what the speakers and community members discussed, such as the important role of religion to their psyche. However, with openness, I could picture how these resources can be very important to and strengthen the community.”
“I think I have developed my ability to actively listen and understand when it is best to listen.”
“I’ve practiced being attentive, receptive, and thoughtful, as I’ve listened to the experiences of those from the community. This is definitely something that I want to continue doing in the future with my work as a nurse, first and foremost making sure that patients/people feel heard and validated in their experiences.”
“This specific project has contributed to my listening skills because a lot of things that were shared in the roundtable were things that I could not personally contribute to which put me in a position to listen and digest what I heard.”
“I have developed my listening skills and now understand that even when people’s concerns don’t involve me, sometimes it’s just beneficial for them to have someone to share their thoughts with.”
“By doing this I felt compassion for the community as they shared their experiences and made me realize that everyone is more similar no matter our backgrounds, where we live, or what our age is.”

## CONCLUSIONS

Developing science literacy and effective science communication are intertwined. Howell and Brossard presented a definition of science literacy that integrated three aspects of the scientific information “life cycle”: how science information is produced and its relation to societal issues, how scientific information is communicated to a broader audience, and how scientific information is interpreted and perceived by the audience (16). The empathy workshops were designed to provide students an opportunity to engage with all three aspects of the life cycle and develop a personalized toolkit for effective, empathetic science communication. This module builds upon preexisting science communication frameworks, such as the Essential Elements of Effective SciComm, to promote effective discussion by centering the assets and needs of the audience. Upon completion of the workshops, we reached out to students and asked them to fill out a survey on what they learned and might use in the future and what they thought could be improved in the workshop. Representative responses are shown in Table 2. While the sample size was small, the results will help inform further workshops and discussion. The student response was overwhelmingly positive, with most (37/39) able to identify ways that the skills developed during the workshop could be applied to their future endeavors. Some students noted the broad applicability of the empathy workshop and suggested using additional topics, other than vaccine hesitancy, to frame the discussion.

As we continue this work, we plan to refine and codify our tools so that they can be replicated in other classrooms, as well as applied across diverse and various modules. Beyond these modules, student responses revealed profound implications for emotional growth, competency, and communication both inside and outside academia. As empathetic and effective communication continue to grow in importance, we hope that this module will serve not only burgeoning scientists, scholars, and clinicians, but also future citizens.

## SUPPLEMENTAL MATERIAL

Supplemental material is available online only.

**SUPPLEMENTAL FILE 1**, DOCX file, 0.03 MB.

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