

Increasing Scientific Literacy Through Hands-on Laboratory Work Guided by Journal Club Discussions

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Our Goal: is to stimulate undergraduate students, especially those from underrepresented backgrounds, at both 2- and 4-year institutions to pursue scientific research by developing their confidence as scientists.

LEADR Program Description:

We have taken the familiar format of advanced science education – the journal club – and reimagined it to bring undergraduate students a way to explore biomedical research through reading scientific literature and hands on experimental design.

This format allows students to:

- Gain content knowledge in various scientific fields
- Build relational capacity with scientist role models
- Get hands-on experience to cutting edge methods
- Practice both written and oral scientific communication skills.

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Pilot: Participants work with graduate students to complete a wet lab activity- *in vitro RNA transcription*

Pilot: Participants work with graduate students/

postdocs to discuss a journal paper

Implementation:

The LEADR model includes, a series of modules exploring a single research topic.

Each module comprises of:

- Lecture introducing the research topic
- Hands-on wet lab activity (or dry lab)
- Interactive discussion of research article
- A science communication **project** synthesizing and presenting content learnt

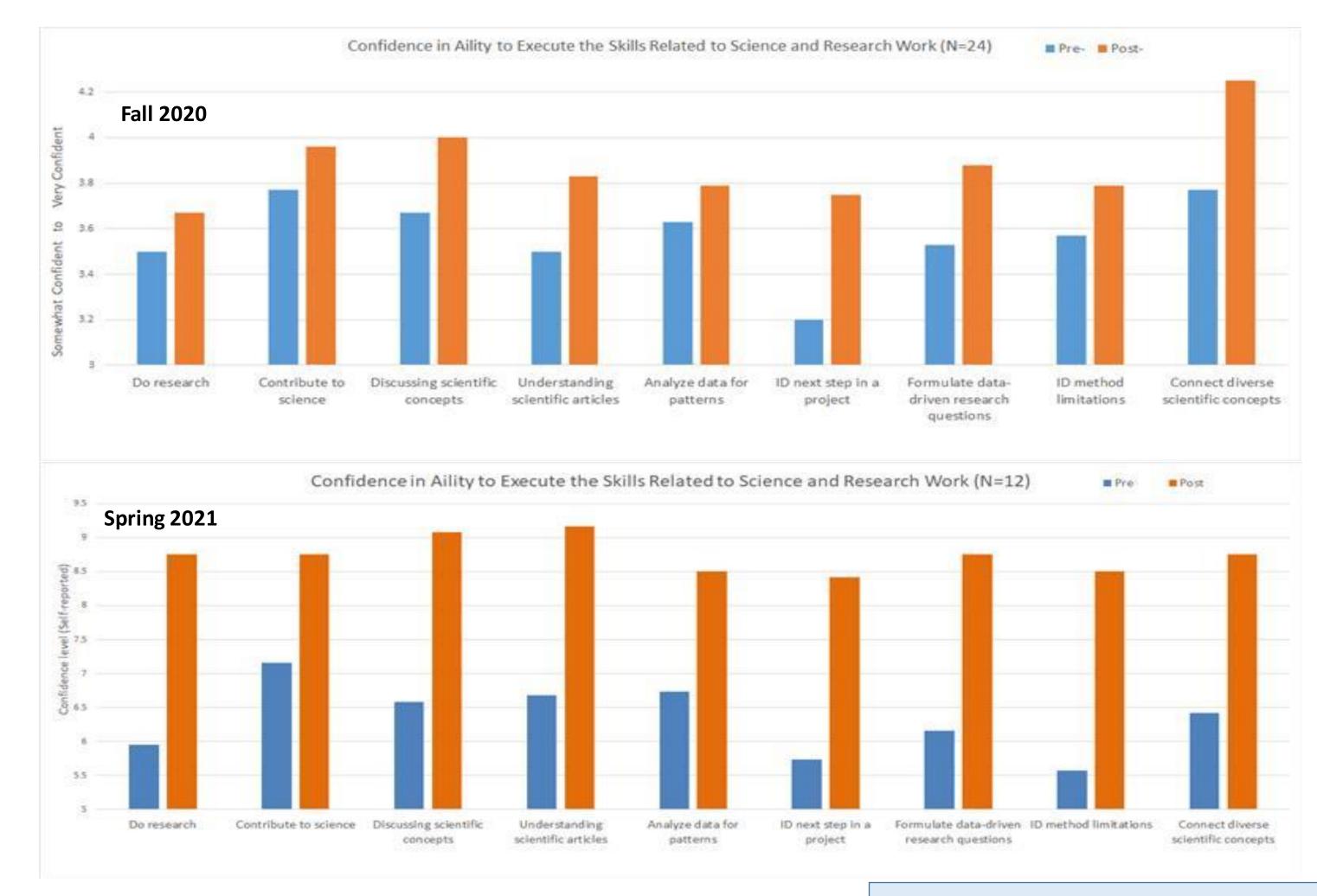
Iteration #	Implementation	Format	Duration
Pilot	in person	Lecture, discussion & lab	1 day
Fall 2020	virtual	Lecture & discussion	6 weeks
Spring 2021	virtual	Lecture, discussion, lab & project	8 weeks

Fall 2020: 30 students were registered, 25 completed the program. This iteration was conducted without labs.

Spring 2021: 25 students were registered, 12 completed the program. This iteration included dry lab activities.

Program Evaluations:

- Pre & post evaluation surveys were conducted
- Scientific literacy was measured as self reported confidence levels:



- Most students strongly agreed the program helped them understand what scientists do.
- Of those who responded, 72% of students from Fall 2020 and 100% of students from spring 2021 said they would attend the program again

Compared to the beginning of the program, now you have a better understanding of what ... Fall 2020 Spring 2021 100% 60% 40% a scientist does research entails needed for STEM careers Strongly disagree Disagree Neither disagree nor agree Agree Strongly agree

Qualitative comments:

"I have a better understanding of how the fields are interlaced and the research from the beginning of an inquiry can lead to modern advances by altering different parameters of a hypothesis."

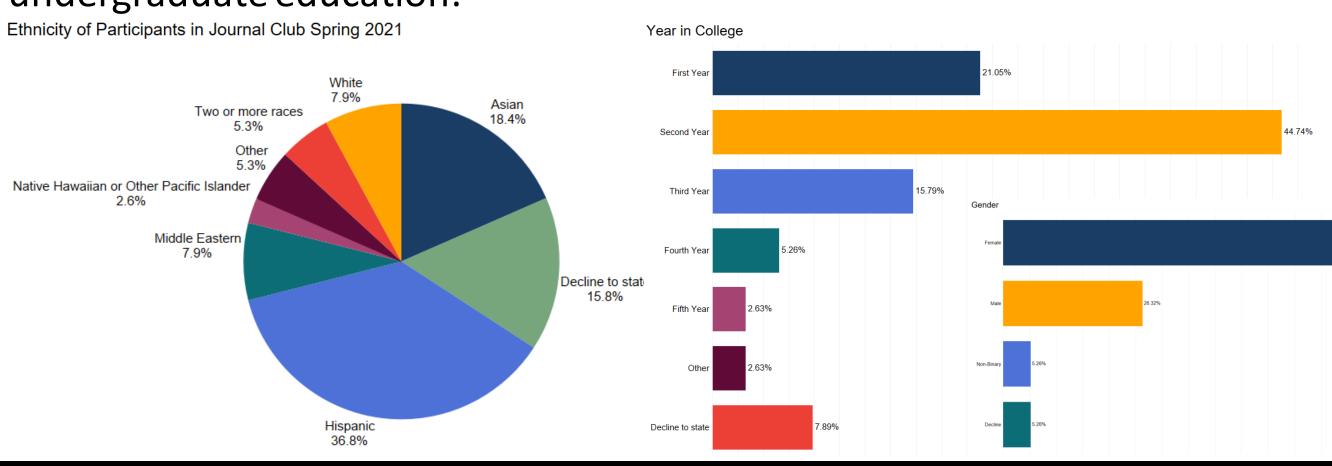
"This was my first course of this kind. I didn't even know this existed in the past. I found it incredibly beneficial. I loved that we were paired with different graduate students who we were able to ask questions and get to know. I wish the meetings were longer than an hour as it felt the time passed so quickly..."

Program Interest:

A list of 150+ interested undergraduate students wanted more of:



Our diverse participants comprised of students in various stages of their undergraduate education:



Conclusions and Future Directions:

- LEADR participants report great satisfaction with the program
- LEADR successfully increases scientific literacy and confidence as scientists
- Next steps: to scale this model, we will implement semester long courses to be tested
- Deliverables created by LEADR participants will be disseminated for public consumption.



Spring 2021: Participants work with graduate students/postdocs virtually to complete the program