

# Introduction

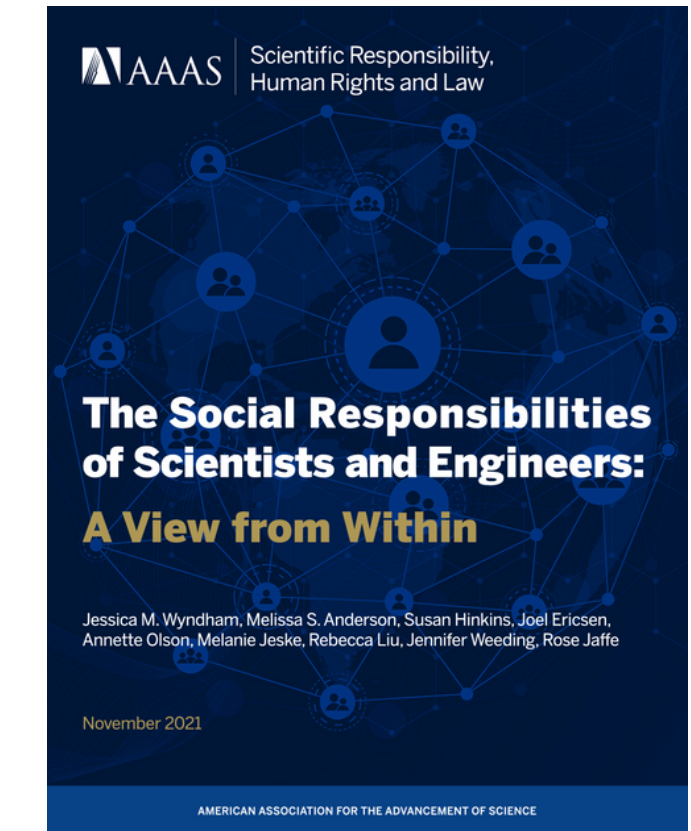
Ongoing tensions exist between objectivity and advocacy in the scientific enterprise and how to best train upcoming STEM (science, technology, engineering, and math) researchers in an era of misinformation, lack of public trust in science, political turmoil, and intense competition for research grant funding. Narrative Transportation and Dialogue-Based Training guided this study. The purpose was to explore early career ANR scientists' perceptions of social responsibility as well as impact of a mini documentary about ecosystem research in the Everglades Agricultural Area on their potential social responsibility behaviors.

- Research questions (RQs):
1. What do ANR graduate students perceive to be the ideal qualities of a socially responsible scientist?
  2. What methods do ANR graduate students agree that scientists should take to promote their research with public audiences?
  3. What personal actions do ANR graduate students believe to be acceptable for scientists to take in advocating for their own research?
  4. How did a mini documentary focused on soil and water sciences research in the EAA impact early career ANR scientists' perceptions of their social responsibilities?

# Literature Review

## Social Responsibility in Science

- Science, society, scientists' roles & and responsibilities (Brunner & Ascher, 1992; Kuhn, 1970; Mieg, 2022; Oreskes, 2020; Valcárcel & Lucena, 2014; Weed & McKeown, 2003; Wyndham et al., 2021)

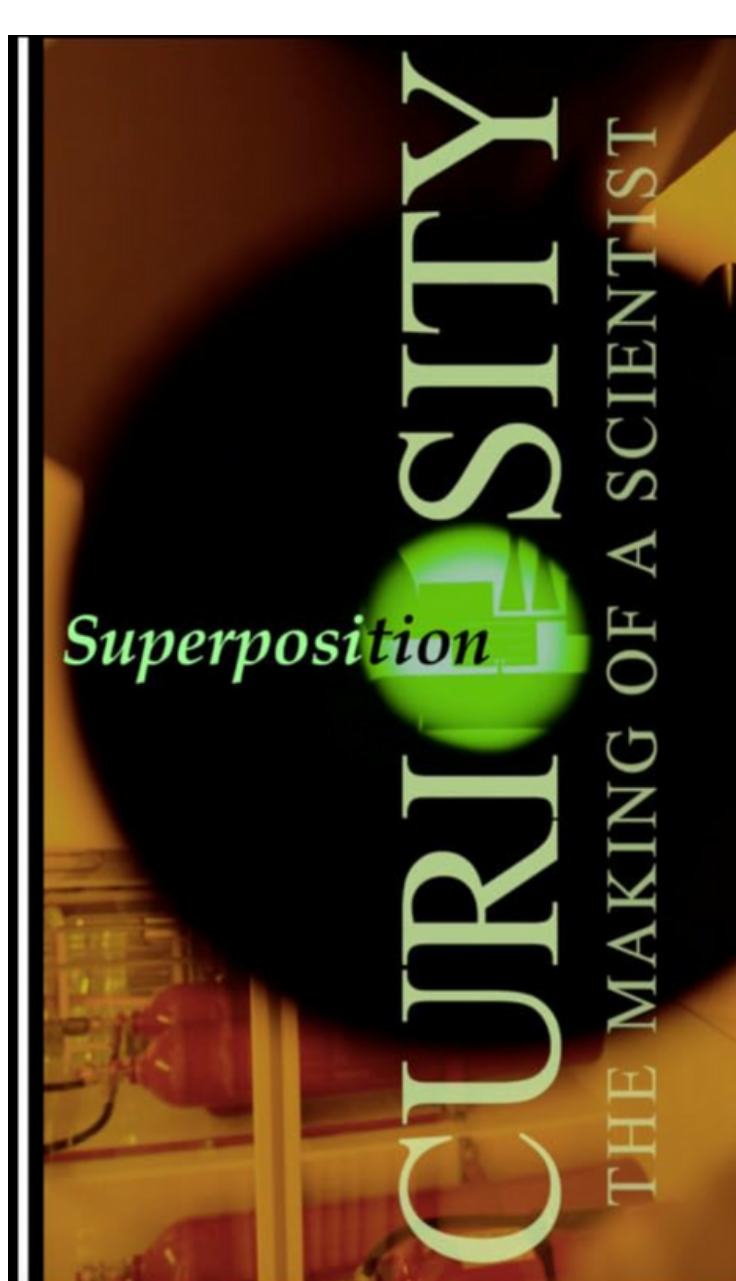


## Objectivity vs. Advocacy Tension

- Objectivity as ethical (Bacon, 1620; Carrier, 2012).
- Call for a new modern ethic that includes advocacy (Chui et al., 2001; Kotcher et al., 2017; Saenko et al., 2019).
- Some argue science advocacy can promote change, while others argue it is inappropriate and unprofessional (Blockstein, 2002; Garrard et al., 2015).

## Documentary to Communicate Social Responsibility in Science

- Scientists believe they have some responsibility to engage audiences (Parrella et al., 2022)
- Scientists value collaboration with science communication (Krebs et al., 2020)
- Co-construct documentaries about STEM issues, careers, and research (Gaunkar et al., 2022; Taylor, 2022)



# An Exploration of Early Career Agricultural and Natural Resource Scientists' Perceptions of Social Responsibility

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At the intersection of STEM career expectations and social and political strains, a need exists to leverage innovative science communication and social science research techniques to explore agricultural and natural resources (ANR) upcoming scientists' perceptions of social responsibility and their roles in research ethics and public and policy engagement.

Category	Summary Statement	Collapsed Concepts
<b>Personal Qualities</b>	A scientist should personally be open-minded, humble, empathetic, respectful, educated, work passionately, and look to the future.	·Open-minded/thoughtful ·Empathetic ·Humble ·Respectful/respect for others ·Knowledgeable/educated ·Forward-thinking/future looking ·Passionate/Disciplined/Hardworking
<b>Research Ethics</b>	A scientist should conduct ethical research that is unbiased, honest, trustworthy, valid, and contextually appropriate.	·Unbiased/Ethic /Fact/Not biased (politically)/ Objective ·Honest ·Trustworthy ·Evaluate your science with findings of other scientists/Make testcases/explore the scientific truth/consistency ·Aware of context/geographical area
<b>Communication</b>	A scientist should a) listen to stakeholders, b) transparently communicate, educate, and engage non-scientific audiences with research results, and c) advocate for their science.	· Society (5) · Space/time/ global/environment · Understand the problem of growers/Have broad perspective of science · Solutions(2)/benefit (2) / research for/contribute to

Table 1 shows thematic coding results for the open-ended survey question answering RQ1

I agree that scientists should...	M	SD	Count
Provide organizational leadership for a cause	4.06	0.79	32
Speak publicly about a cause	4.03	0.98	32
Provide financial support for a cause	3.94	1.05	31
Identify opinions as personally held and separate from the opinions of affiliated organizations	3.93	0.93	30
Write letters to an editor, political, or agency about a cause	3.84	1.03	32
Accept research funding from an advocacy source such as The Nature Conservancy or the Electric Power Research Institute	3.83	1.00	30
Promote a specific policy	3.61	0.94	31
Provide advice on policy before specific options are identified	3.50	1.23	30
Promote a specific society priority	3.48	1.04	31
Provide advice on policy options that were preselected without your input	3.45	1.22	29
State opinions without referring to professional expertise	2.33	1.16	30

Table 3 representing descriptive data answering RQ3

I agree that scientists should...	M	SD	Count
Partner with communication experts to develop content	4.65	0.49	34
Publish in open access journals	4.65	0.54	34
Partner with communication experts to share content	4.62	0.55	34
Promote your research on media that is accessed by non-academic audiences	4.56	0.56	34
Publish simplified versions of your research	4.44	0.66	34
Engage citizen scientists in your research	4.35	0.73	34
Share information with reporters	4.21	0.81	34

Table 2 representing descriptive data answering RQ2

How did the importance of this behavior change for you by watching this film?	M	SD	Count
Communicate your work in a way that makes it understandable to the public.	2.70	0.47	33
Pay particular attention to how your work/research may affect vulnerable populations as might be defined by your discipline (e.g., children, persons with disabilities, displaced populations).	2.70	0.47	33
When deciding on what work/research to pursue, take into account whether its potential effects would benefit or harm society.	2.79	0.41	34
Foster the interests of young generations in science and engineering.	2.52	0.57	33
When it comes to your attention, addressing the improper use of your research findings or products by others.	2.58	0.61	33
When communicating research findings, acknowledge other relevant research interpretations, whether or not consistent with your own.	2.59	0.56	32
Advocate for publicly funded science and engineering that improves the quality of life for some or all members of society.	2.55	0.51	33
Mitigate personal biases in your research and when offering expert advice.	2.62	0.55	34
Engage in public service activities as a scientist or engineer.	2.59	0.50	32
Participate in government policy deliberations in your area(s) of expertise	2.41	0.76	32

Table 4 representing descriptive data answering RQ4

How important do you consider this behavior to be in your work as a scientist or engineer?	AAAS M	AAAS SD	M	SD	Count
Communicate your work in a way that makes it understandable to the public.	2.18	0.85	2.89	0.33	35
Pay particular attention to how your work/research may affect vulnerable populations as might be defined by your discipline (e.g., children, persons with disabilities, displaced populations).	2.22	0.91	2.74	0.44	35
When deciding on what work/research to pursue, take into account whether its potential effects would benefit or harm society.	2.37	0.80	2.69	0.47	35
Foster the interests of young generations in science and engineering.	2.51	0.69	2.66	0.48	35
When it comes to your attention, addressing the improper use of your research findings or products by others.	2.42	0.73	2.63	0.55	35
When communicating research findings, acknowledge other relevant research interpretations, whether or not consistent with your own.	2.44	0.69	2.57	0.50	35
Advocate for publicly funded science and engineering that improves the quality of life for some or all members of society.	2.35	0.80	2.46	0.78	35
Mitigate personal biases in your research and when offering expert advice.	2.54	0.65	2.43	0.78	35
Engage in public service activities as a scientist or engineer.	2.03	0.84	2.31	0.72	35
Participate in government policy deliberations in your area(s) of expertise	2.06	0.83	2.17	0.71	35

Figure 5: A table representing comparative statistic between this study and the AAAS survey, related to RQ4

# Methods

- Exploratory case study (Yin, 2014)
- 20-minute mini documentary
- Watch parties in November 2022
- Predominantly graduate students at UF & EREC
- (n = 35)
- Post-retrospective survey
- Likert scale quantitative
- Open-ended qualitative items
- Descriptive data analysis in Excel
- Comparative statistics in IBM SPSS
- Thematic qualitative coding



# Recommendations

The research team determined the use of narrative transportation coupled with dialogue-based training to be a successful method of determining and altering ANR early career scientists perception of social responsibility. We recommend future researchers:

- examine role models and places through story and demonstration
- reflect on personal ethical perspectives and individual positions
- dialogue about observations and reflections
- assess social responsibility perceptions and behavioral intentions
- scale up this training approach to additional contexts for further research

