



What Are Students Thinking? Analyzing Student Rationale for Socio-scientific Issues

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Introduction

- Socio-scientific dilemmas are becoming more prevalent in today's modern technological society
- Majority of college students made up of non-science majors take a position on these dilemmas
- Out of the 1.9 million degrees conferred in 2014-2015, roughly only 11% were in science or engineering.
- These individuals will go on to be the next politicians, policy makers, voters, etc.

Research Question

What influences non-science major students responses when making decisions about socioscientific issues?

Methodology

- Concepts in Biology (BIO 126) – 200 Student responses (99% response rate)
- Introductory course for non-science majors
- Survey given at the end of the semester
- Included questions about socioscientific issues that were covered in class
- Dual-coded student responses from those who completed survey
- Coding inter-rater reliability was measured by Cohen's kappa (0.81)

Conclusions

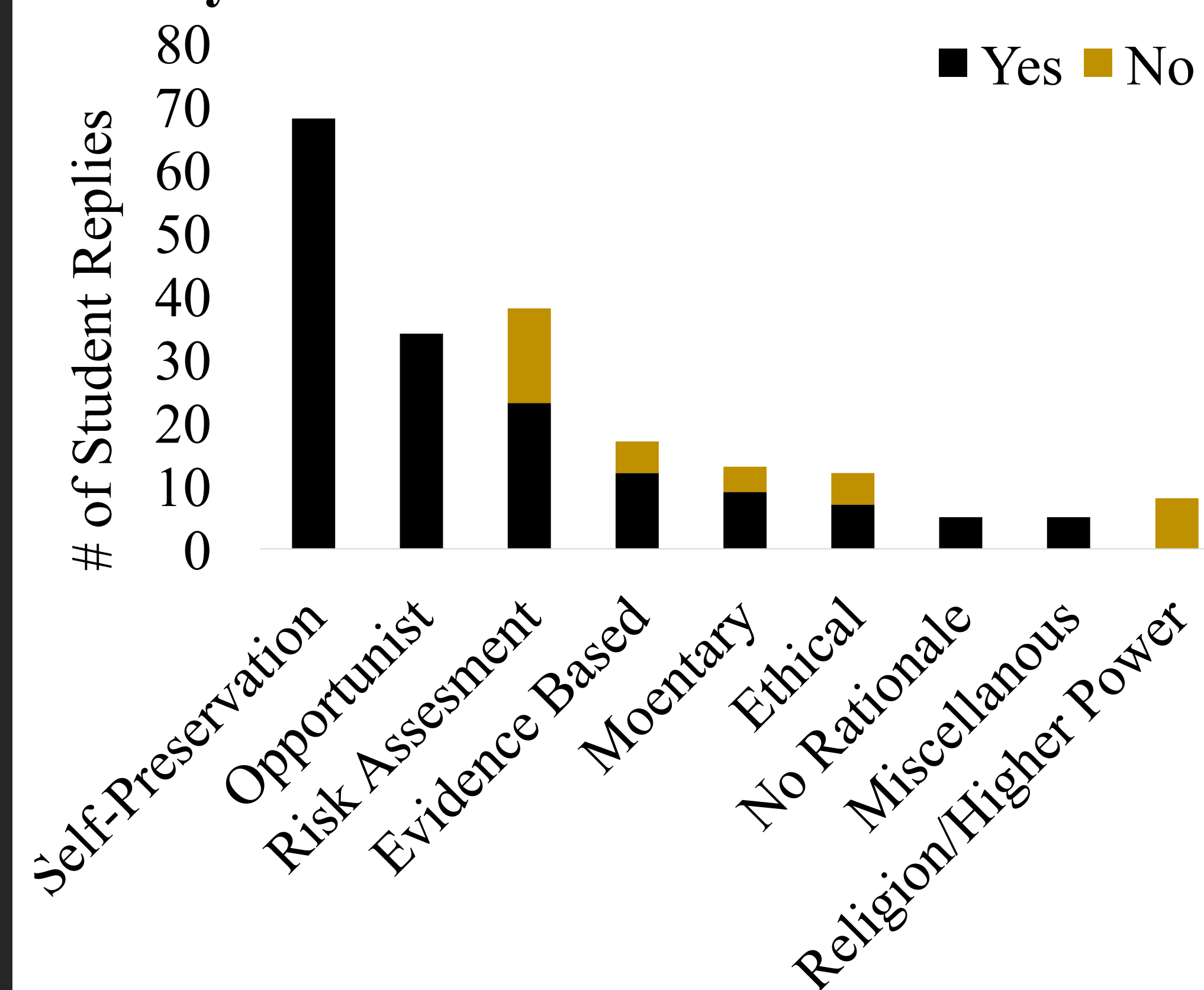
- Preserving health was the most popular rationale used to make decisions
- Only ~10% of students answered used evidence based rationale to make decisions
- Over half of students consistently use non-evidence based rationale across socio-scientific issues
- Very few students consistently use evidence-based decisions about socio-scientific issues

Discussions

- Students can be scientifically educated on socio-scientific issues, but that does not mean that this knowledge will become the heaviest influence on their overall decision-making
- The low prevalence of evidence based rationales could be due to the fact that these two technologies are still heavily regarded as 'risky' or too experimental to use

Results

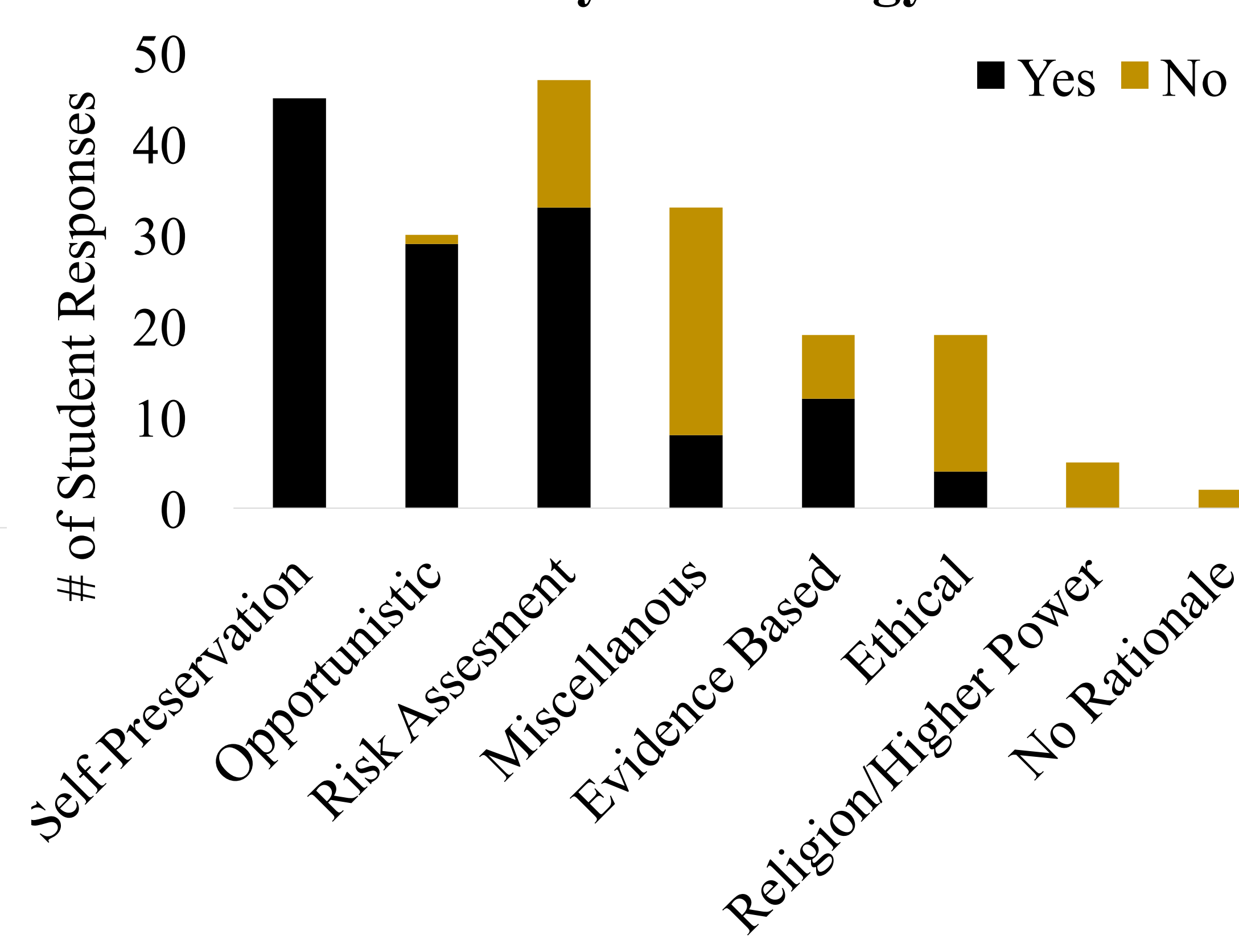
Q #1: If you had genetic disease (ex: cystic fibrosis) that could be treated using CRISPR, would you use it?



Self-preservation was the most prevalent rationale used when deciding to use CRISPR gene editing

Only 9% of students answered using an **Evidence-Based** rationale

Q #2: If you were in need of an organ transplant, would you accept an organ grown via chimera embryo technology?



Self-preservation was also the most prevalent rationale used when deciding to use chimera embryo technology

Roughly 10% of students answered using an **Evidence-Based** rationale

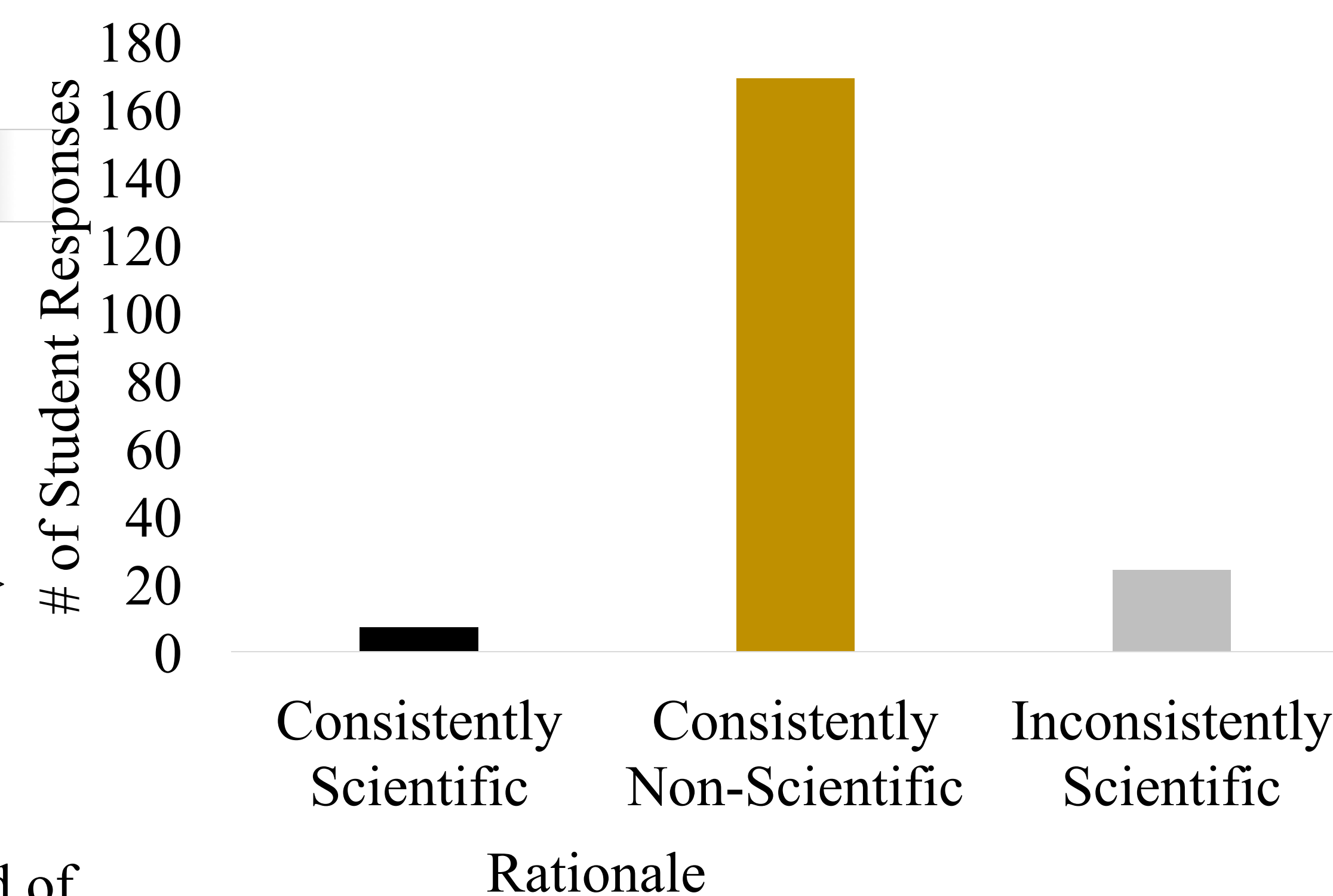
Code	Description
Self-Preservation	I want to better my life/health, help my kid
Opportunist	Would do anything, if we have the technology let's use it
Risk Assessment	Risk outweighs reward, potential side effects, would use if proven safe
Evidence- Based	Based off educational knowledge learned or known prior
Monetary	Don't have the money; will use if I can afford
Ethical	Help others first; Unjust; it's the right thing to do
Miscellaneous	Response uses personal feeling or other kind of rationale
Religion/Fate	Should not play God/ 'Was meant to have this disease'
No Rationale	Did not provide a response. Left the question blank.

*Note that the only difference between rubrics is that Q #2 did not have a code for monetary

Are students consistent in their decisions?

CHIMERA EMBRYO					
		Yes	No		
CRISPR	Yes	118	45		
	No	14	23		
	Total	132	68	200	

59% of students were consistent in answering yes to both the CRISPR and Chimera Embryo question. Chi square value $\alpha > 2.51 \times 10^{-24}$ was significant.



Future Directions

- Same survey to be given at the beginning and end of the course to track the effect of instruction on how student make decisions
- Analyze other socio-scientific issues to determine how consistent student rationale is across other controversial areas (ex: sex determination).

~4% of students consistently used scientific rationale when answering the two survey questions (only 7 students).

Acknowledgments

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