



REU Students' Initial Perceptions of Scientific Ethics

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Motivation

- NSF is now requiring all its programs to contain an ethical training component.¹
- When comparing physics and biology undergraduates an analysis of the Survey of Undergraduate Experiences (SURE) shows a difference in perceived benefit in learning of ethical conduct during the Research Experience for Undergraduates (REU) experiences.²
- 21 items, 1 on ethics, ranked on a 5 point Likert scale from “No gain or very small gain” to “Very large gain.”

Field	2009 Average Ranking on Ethics Question ³
Biology	3.20
Physics	2.39

Why do the two groups report different perceived gains in learning ethical conduct on the SURE?

Demographics

Field	Gender		Year in School			Research Experience	
	M	F	So	Jr	Sr	Y	N
Biology	3	9	1	5	6	7	5
Physics	10	4	2	6	6	8	6

2010 SURE Survey Results

Field	Average Ranking on Ethics Question ³
KSU Biology	2.25
KSU Physics	2.92
Universities	3.28
All Students	3.11 (SD 1.23)

Comments

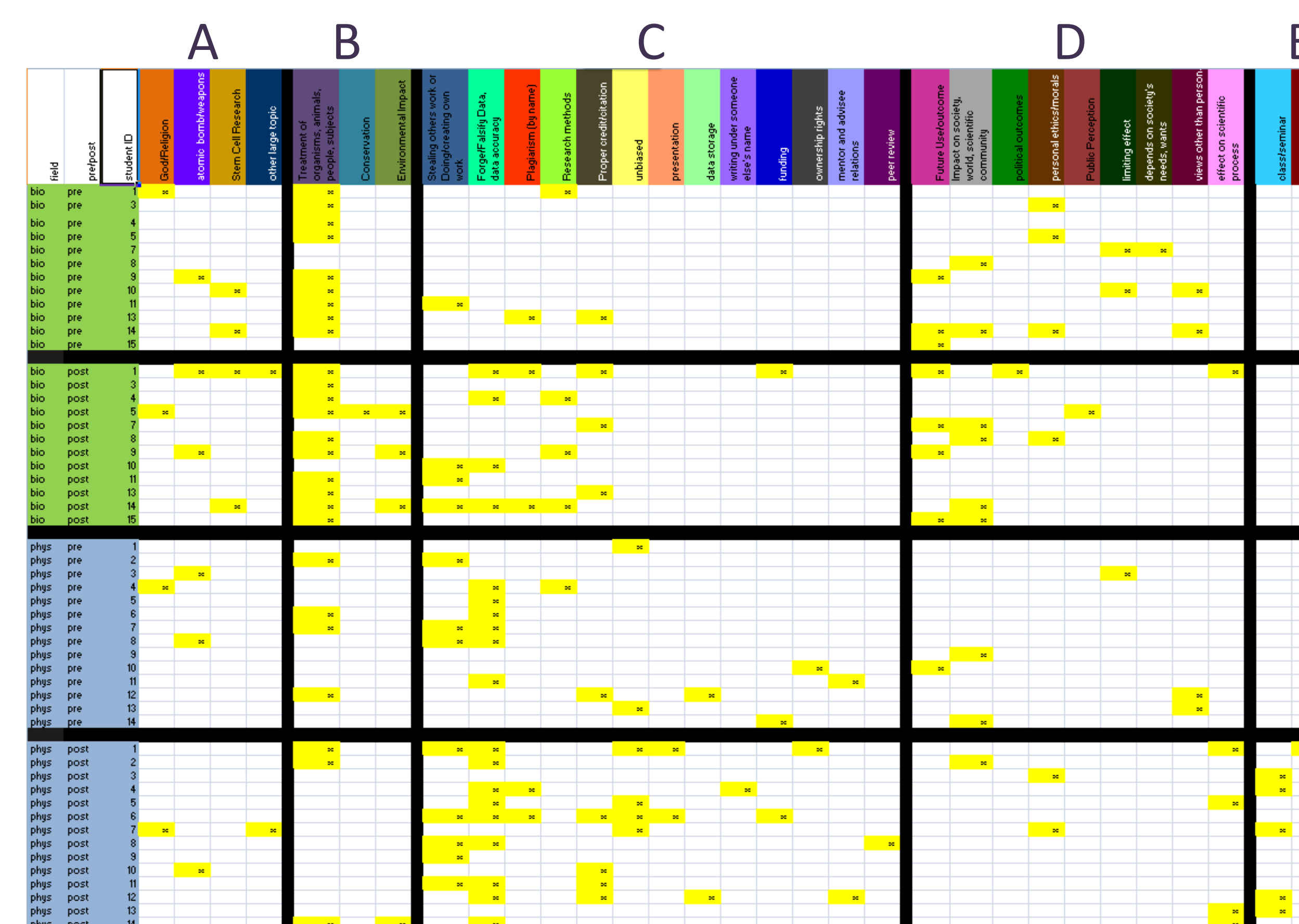
- Based on the SURE survey results, it is unclear if the KSU-REU students are representative of the overall student populations.
- Many of the KSU biology REU students were studying topics more closely associated with ecology.
- Both REU programs have an ethics training component.
 - Physics: Seminar taught by members of the philosophy department specializing in ethics.
 - Biology: Discussions by mentor professors, including stories from their own experiences

Data Collection and Analysis

- Interviews performed by both Murphy and Zollman.
 - Entrance interview – completed in June 2010
 - Exit interview – completed in August 2010
 - SURE survey – completed in August 2010
- Ethics questions at midpoint of interview after demographics, REU program, and scientific knowledge questions.
- Phenomenographic data analysis.
 - Codes are grouped into sets of related responses.
 - Group A: Larger issue like religion or weapons
 - Group B: Treatment of subjects and environment
 - Group C: Issues related to the research process (data acquisition, management, presentation, etc...)
 - Group D: Other concern or issue
 - Group E: Mention of class, seminar, or interaction with a professor
 - Group F: Do not believe or know if there are ethical issues.

Question 1:

What are the most important issues that physicists (biologists) must consider to behave ethically?



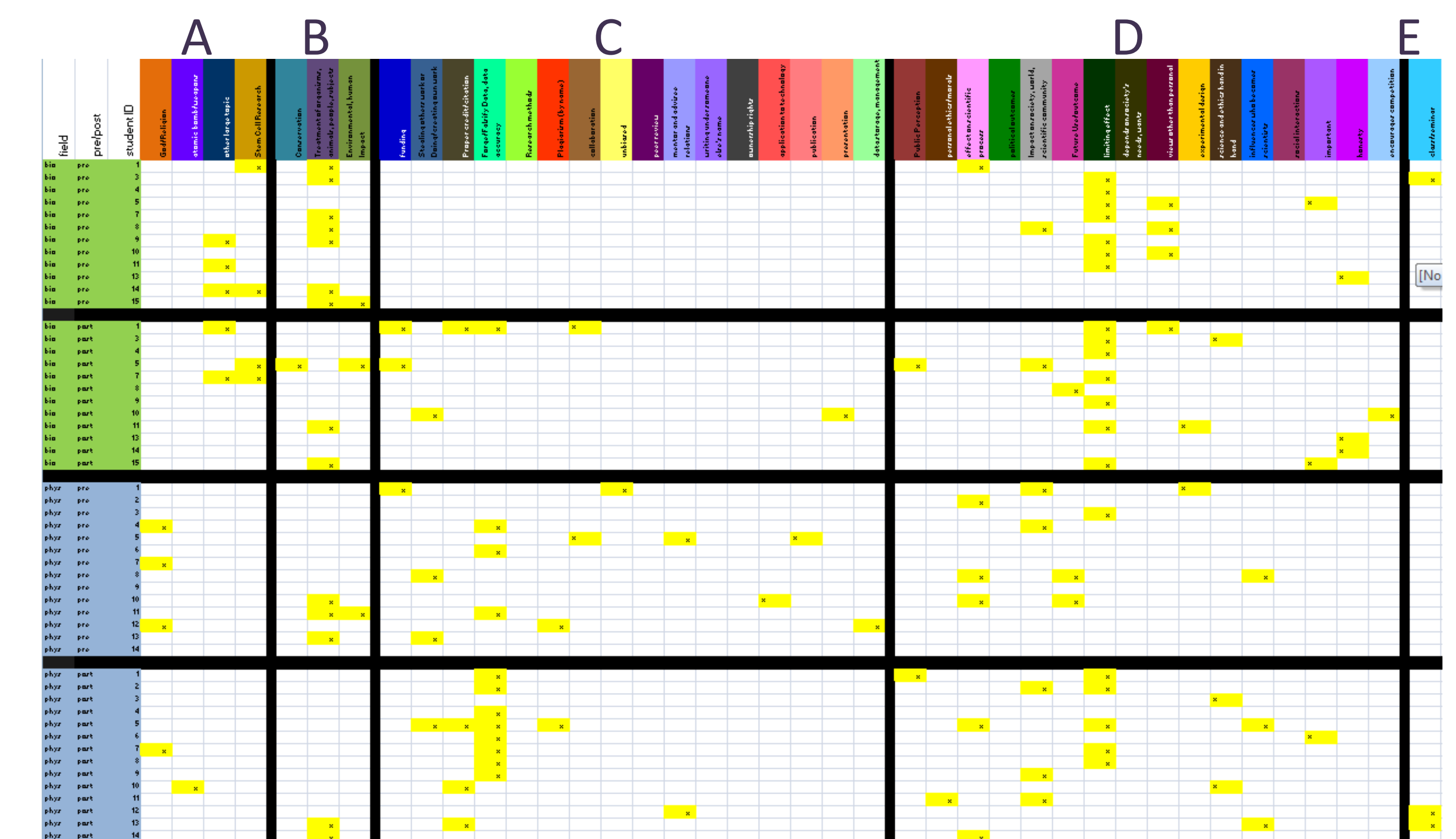
(Cells in yellow indicate student responses)

References

- <http://www.nsf.gov/pubs/2009/nsf09598/nsf09598.pdf>
- D. Lopatto, *Cell Biology Education*, **3**, 270-277. (2004).
- David Lopatto (private communication). Data used with permission.

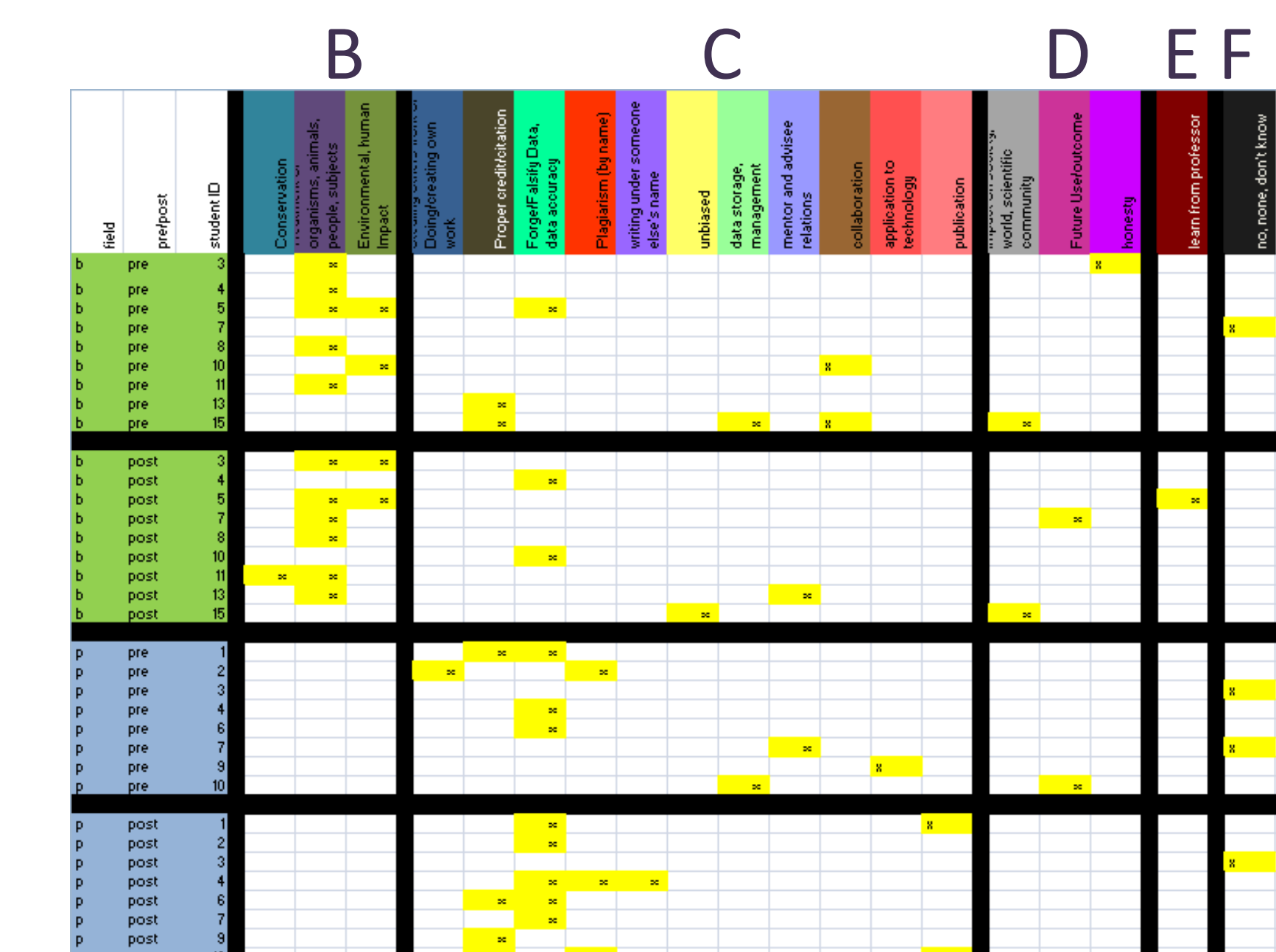
Question 2:

How do ethics impact physics/biology?



Question 3:

What about ethics in your own research?



Conclusions

- We do see differences in the responses of the these two groups of students.
- Biology students are more likely to comment about treatment of subjects and the environment (Group B).
- Physics students are more likely to address topics associated with the research process like data acquisition, analysis, and presentation (Group C).
- Many students are concerned with issues outside accepted areas of scientific ethics (Groups A and D).
- Conduct additional interviews next summer with a refined question list.