



# Exploring the Impact of Jargon on Student Learning in Biology: Student Understanding, and Self-Perception of Understanding, of Technical Vocabulary



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## Background

- Effective communication and collaboration is a key goal in biology education<sup>1</sup>, and requires mastery of both conceptual ideas as well as technical vocabulary.
- The “jargon load” is a particularly prominent hurdle in introductory biology courses<sup>2</sup>, and can negatively impact learning<sup>3,4</sup>.
- Little work has been done to characterize student understanding of biology-specific jargon\*, and to distinguish between types of jargon that may differently impede student learning.

\***jargon**: technical vocabulary terms used in a discipline, the meaning of which is not always intuitive (especially to novices)

## Methods

Students could take a voluntary online survey to test their knowledge of various technical terms used in biology.

For each term, the student was asked:

1. Do you **recognize** this term?
2. Do you think you **understand** this term?
3. Provide a **definition** for this term

Terms were randomly provided, and students could answer as many questions as they liked.

A total of 2400 student responses were collected for analysis.

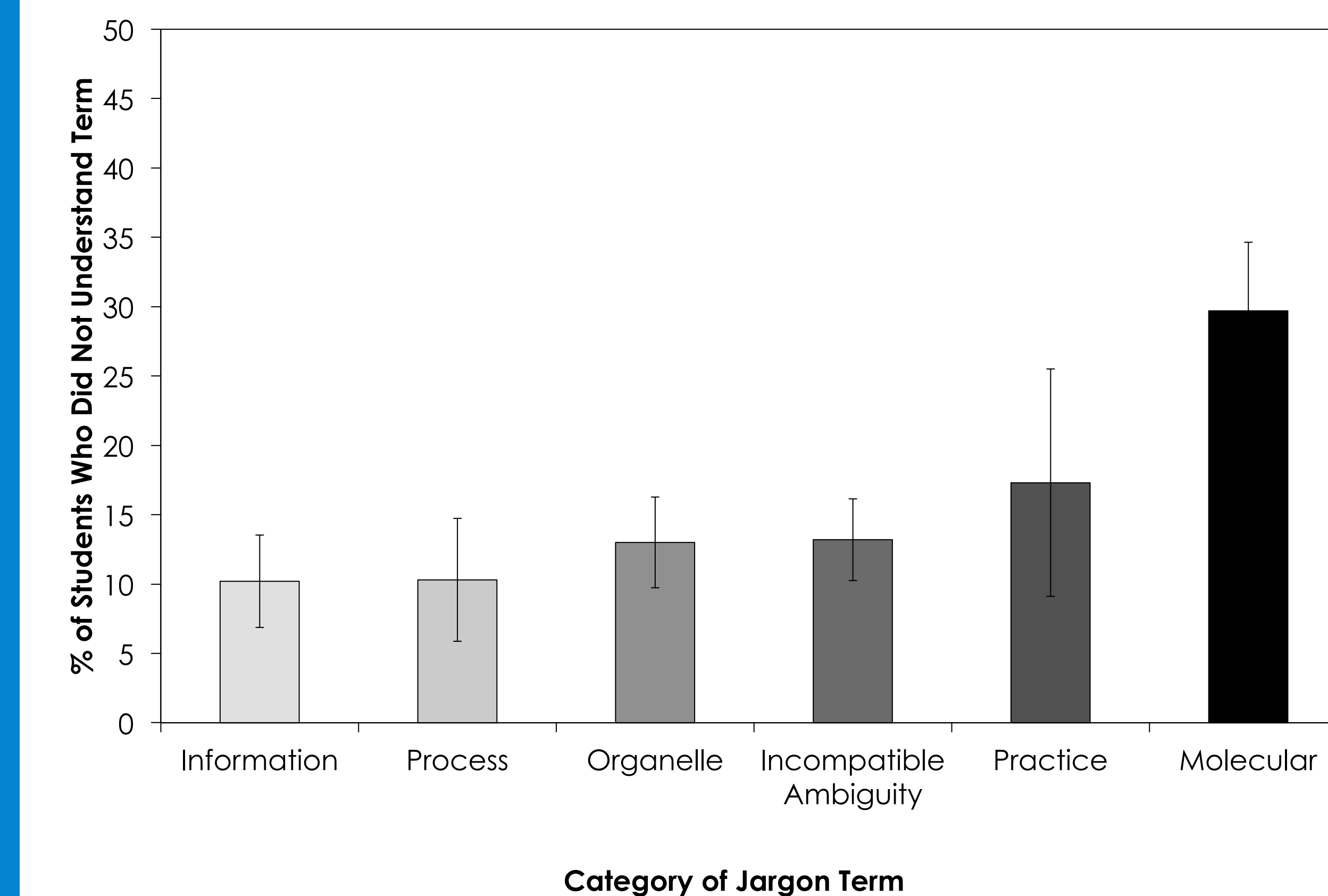
93 terms were classified into the following categories (not mutually exclusive):

- **Molecular (25 terms)**: relates to molecular or macromolecular structures (e.g., ligand)
- **Practice (8 terms)**: relates to the practice of science itself (e.g., control)
- **Incompatible Ambiguity (31 terms)**: used in everyday English vernacular in a way that may differ from use/meaning in biology (e.g., fitness)
- **Organelle (12 terms)**: name of an organelle or part of an organelle (e.g., lysosome)
- **Process (7 terms)**: cellular or biological processes (e.g., transcription)
- **Information (15 terms)**: relates to descriptions and transfer of information (e.g., genome)

Definitions of **information** and **molecular** terms provided by 200-level students were coded for accuracy against definitions provided by course instructors. Answers could be **correct, partially correct, incorrect, or unanswered.**

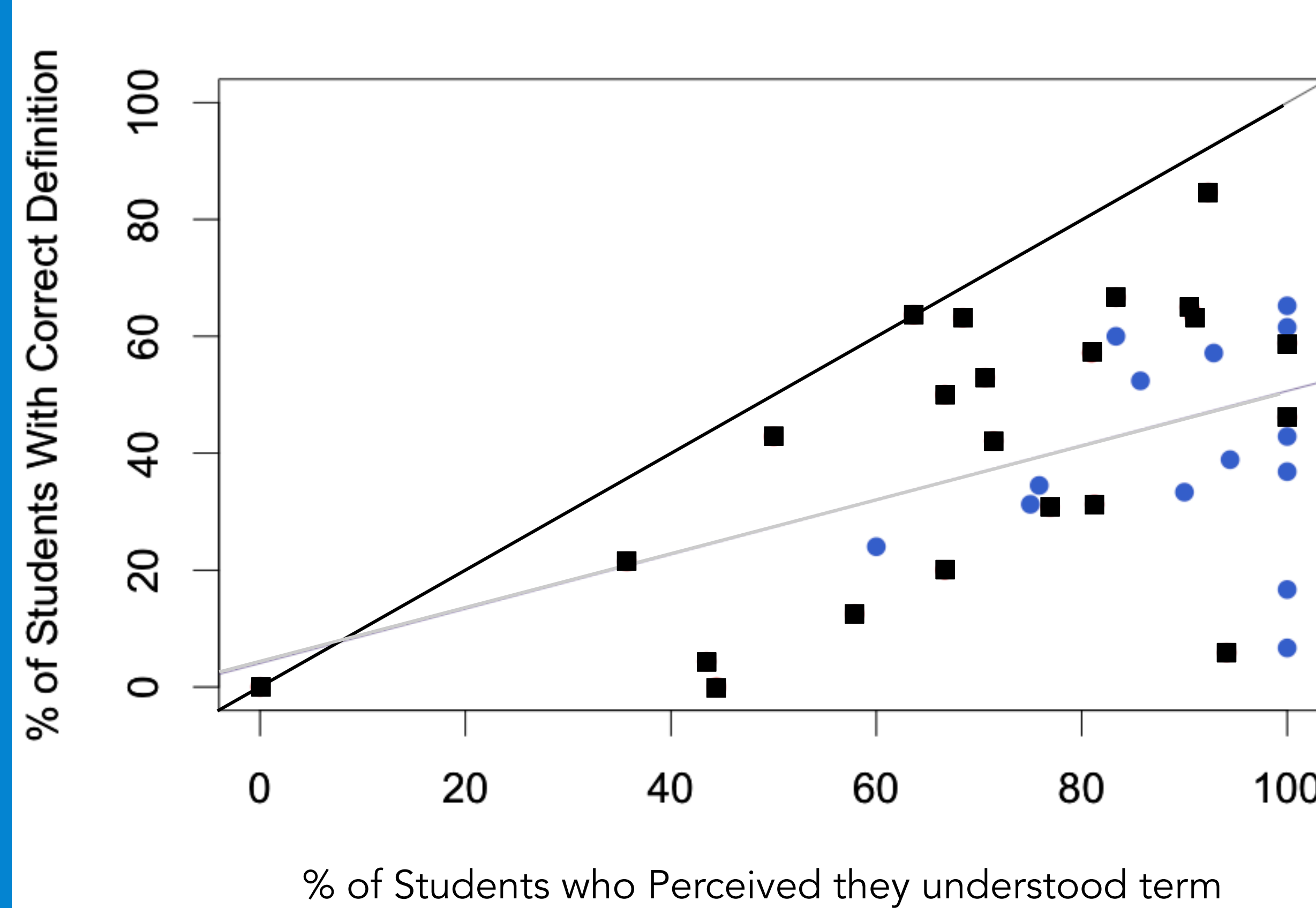
## Results

Students perceived **information** terms to be easiest and **molecular** terms to be most difficult to understand



Mean & SE, by category, of the % of responses in which 200-level students said that they did not understand the term. \* = significant by Kruskal-Wallis test (comparing terms in the category to all other terms)  $p < 0.05$ .

Students overestimated their understanding of jargon

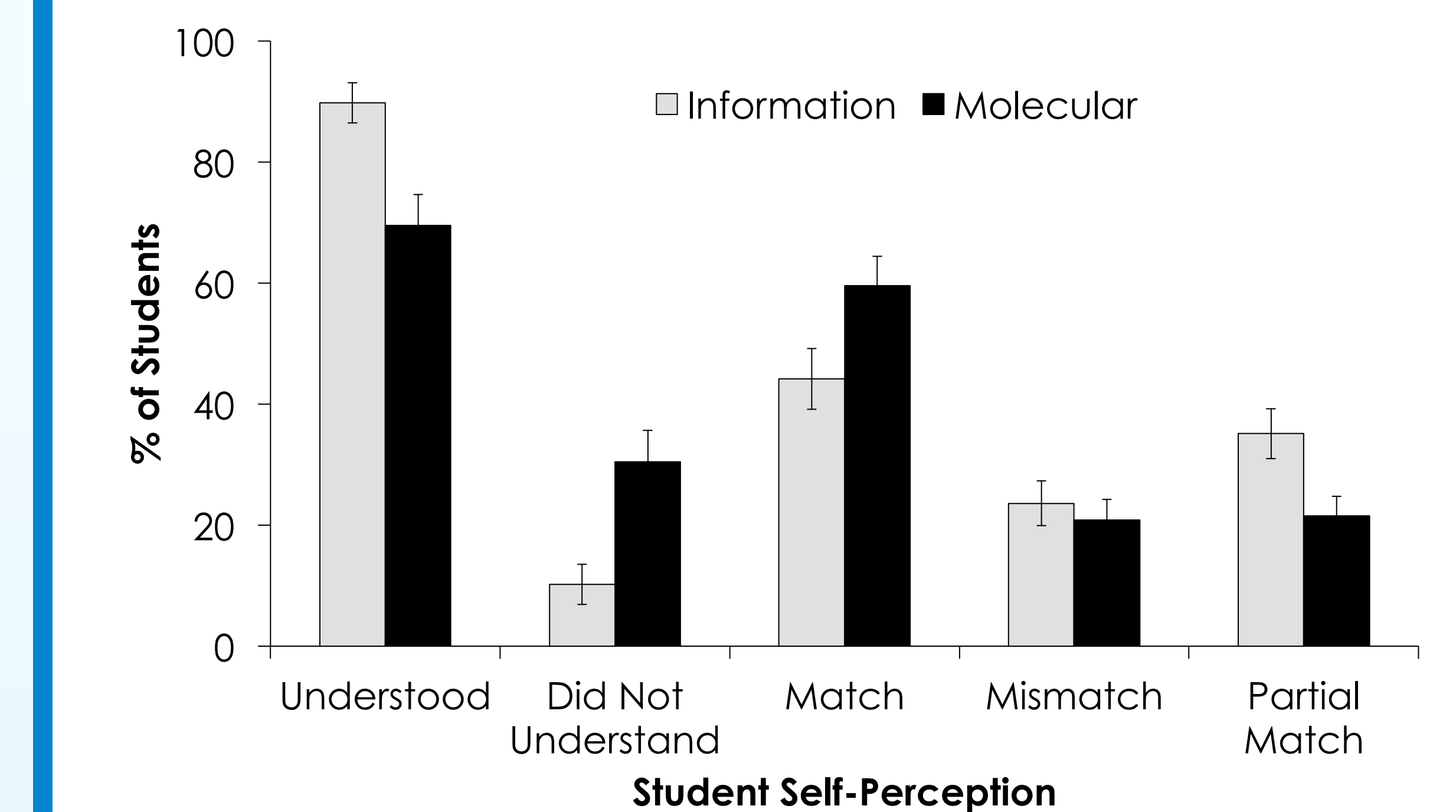


Comparison of % of students who understood the term and % of students who provided correct definitions for 22 **molecular** terms and 14 **information** terms defined by 200-level students. The black line represents a 1:1 ratio and the purple line represents a regression with all points ( $R^2 = 22\%$ )

## References

- 1 American Association for the Advancement of Science (AAAS). 2009. [www.visionandchange.org](http://www.visionandchange.org).
- 2 Groves FH. 1995. School Science and Mathematics, 95, 231–235.
- 3 Brown BA, and Ryoo K. 2008. Journal of Research in Science Teaching, 45(5), 529–553.
- 4 McDonnell L, Barker MK, and Wieman C. 2015. BAMBED Journal, 44:12–19, 2016.

Students’ self-perception of their understanding matched their understanding more often for **molecular** terms and less often for **information** terms



Comparison (mean and SE) of 200-level students’ perception of their understanding and accuracy of self-assessment (whether their self-reported understanding matched or did not match the accuracy of their definition)

## Common Errors

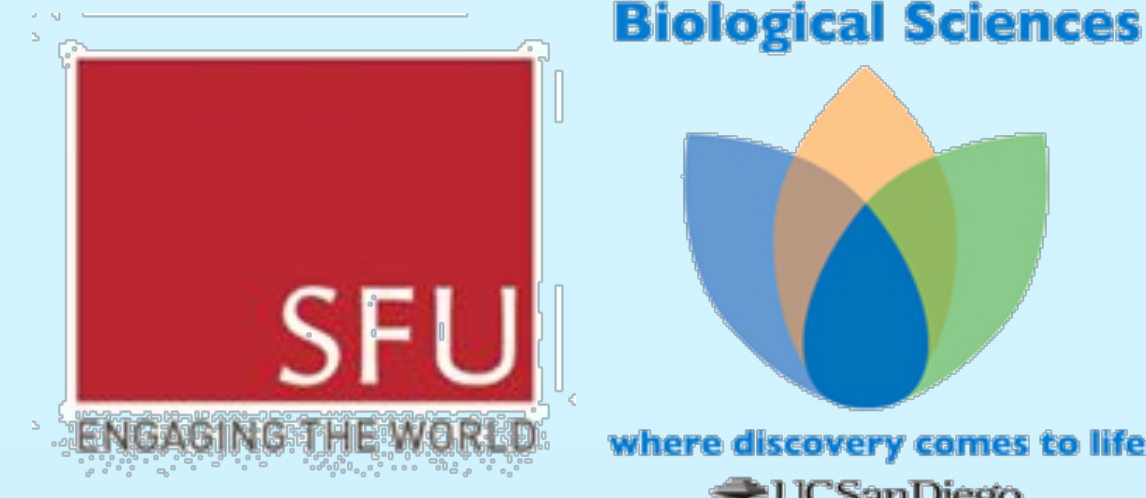
- **Omission of key component**: e.g., no mention of RNA in transcription definition
- **Defined another term**: e.g., “paternal”, not “parental”
- **Inaccuracy**: e.g., clathrin is a vesicle
- **Vernacular**: 80% of students perceived they understood these terms, but only 27% provided correct definitions.

## Conclusions and Teaching Implications

- Not all jargon is created equal – greater struggle with jargon relating to abstract phenomena
- Students overestimate their understanding and may not know that they don’t know:
  - Mastery of a concept and gains in literacy may be negatively impacted
- Important to identify troublesome jargon and spend time explaining the meaning behind it:
  - Ensure sound conceptual understanding and then layer on jargon

## Acknowledgements

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## Purpose

The objectives of this study were to:

- 1) Determine the types of biological terms that undergraduate students struggle with most
- 2) Identify common errors in student understanding

## Study Population

Participating students were enrolled in one of the following courses:

- A) Genetics, Evolution & Ecology (1<sup>st</sup> year course)
- B) Cell Biology (2<sup>nd</sup> year course)
- C) Genetics (2<sup>nd</sup> year course)