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

Jenna M. Zukswert¹, Megan K. Barker¹,², and Lisa McDonnell¹,³*

¹University of British Columbia, Vancouver, BC; ²Simon Fraser University, Burnaby, BC; ³University of California San Diego, San Diego, CA  *lmcdonnell@ucsd.edu

Background

A) the following courses:

1) Genetics, Evolution & Ecology (1st year course)
2) Cell Biology (2nd year course)
3) Genomics (3rd year course)

The “jargon load” is a particularly prominent hurdle in introductory biology courses¹, and can negatively impact learning²,³. Little work has been done to characterize student understanding of biology-specific jargon⁴, 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)

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 (1st year course)
B) Cell Biology (2nd year course)
C) Genomics (3rd year course)

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 andtransfer 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.

Students overestimated their understanding of jargon.

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

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

Instructors and students of the courses involved, including N. Abraham, L. Chen, J. Cooke, L. Kunst, M. Gravas, P. Kalas, J. Kienz, R. Young

References


Common Errors

• Omission of key component: e.g., no mention of RNA in transcription definition
• Defined another term: e.g., “parental”, not “parental”
• Inaccuracy: e.g., clathrin is a vesicle
• Vernacular: 60% of students perceived they understood these terms, but only 27% provided correct definitions.

Comparation of % of students who understood the term and % of students who provided correct definitions for 22 molecular terms and 14 information terms (blue) defined by 200-level students. The black line represents a 1:1 ratio and the purple line represents a regression with all points (R² = 22%).