Impacting student learning
cognitive load traditionally taught (i.e., in synchrony) the concepts and vocabulary are
For many science students, and for many
If the concepts and vocabulary are
An assessment of the influence of technical vocabulary on conceptual learning

Background: The Jargon Problem
• To achieve fluency in a scientific discipline, students must learn the discipline-specific concepts and their technical vocabulary.
• There are more new vocabulary terms in first-year science textbooks than in introductory foreign language classes.
• For many science students, and for many diverse reasons, this new technical vocabulary (or jargon) is often a barrier to subject mastery and to student identity as a potential scientist.
• If the concepts and vocabulary are traditionally taught (i.e., in synchrony) the cognitive load may be overwhelming, impacting student learning.

Experimental design: Control/Treatment, in 4 sections of a large first-year biology course
Topic: Genomes and DNA structure
Pre-class reading & quiz: Jargon-free
Start of class: Introduced to vocabulary
During class: Worksheet, mini-lecture, clickers, worksheet
Last part of class: Post-test

Data Collected:
Student populations in each section: Concept inventory: pre-test scores
Prior to class: Pre-reading quiz online
Determining our cohort of participants: Clicker question in class asking who did pre-reading (n=42 in each group)
Learning assessment: Post-test (4 multiple choice questions, 2 open response)
Student opinions on jargon: Survey posted online

Results: Student performance

• Concepts-first (Treatment) sections: Concepts-first
• Normal (Control) sections: Normal (jargon)
• No different in student scores between questions that do or do not include jargon

Multiple choice questions:

<table>
<thead>
<tr>
<th>Percentage of students answering correctly</th>
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</thead>
<tbody>
<tr>
<td>Control</td>
</tr>
<tr>
<td>DNA structure (with jargon)</td>
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Open response - Concepts:

• Concepts-first students gave 1.5 to 2.5-fold more correct arguments than control group students
• Concepts-first students better at explaining their understanding

Open response - Jargon:

• Jargon usage: the same, or better in Control
• Jargon 1: need to investigate novelty vs. true difficulty of a particular term

What do students think about jargon?
• 67% agree that it is challenging to learn a new concept when there is a lot of jargon
• 78% agree that it would be easier to learn a new concept in everyday language

“Using big words to describe something that could be explained in everyday language does not make the subject more interesting or sophisticated.”
“It would be easier to memorize the jargon when we have a deep understanding of the concept.”
“Students would be able to understand a concept in an easier fashion and then build upon that learning with the proper term/jargon.”

Conclusions & Next Steps
• This modest instructional change has great potential for supporting learning of diverse students.
• The content-first approach does not affect students’ ability to recognize correct concepts or jargon
• Content-first approach may improve students’ ability to articulate their understanding: Constructivism?
• Students feel that learning new concepts without jargon, at first, might help their learning.
• Not all jargon is created equal: what is jargon to instructor may not be jargon to students.
• Next steps: Assess what kinds of jargon are most difficult for (which?) students in (which?) classes.
• Interested in discussing more or collaborating on a project? Let me know!

Thank you to... The many students who participated in this work: The biology instructors who supported us here:  S. Chowrira, C. Douglas, E. Hinze, K. Smith, and to Laura Weir for discussions on study design and statistical analysis.

References

Method: Study Design and Context

Results: Students perspectives

• Can we increase student learning of concepts and jargon by teaching them separately rather than together?
• How will student learning be affected if we first teach the concepts in plain language, before teaching jargon?

Results: Student opinions on jargon

• Concepts-first students gave 1.5 to 2.5-fold more correct arguments than control group students
• Concepts-first students better at explaining their understanding

Analysis strategy:

• Analyzed data for students who completed the pre-reading
• Blind-coded open response questions for presence and correctness of concepts, jargon (iterative process to develop coding scheme)
• Compared post-test scores between treatment and control groups

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