

Concept first, jargon second: An assessment of the influence of technical vocabulary on conceptual learning

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Rationale/background

- Learning discipline-specific **concepts** and the **technical jargon** that represents them is required to achieve fluency in a scientific discipline.
- Traditionally, concepts and jargon are taught **in aggregate**. This may increase student cognitive load, impacting learning of the concepts (Brown and Ryoo, 2008).

Research Question:

How will student learning be affected if we teach the concepts in plain language first, before teaching jargon?

Aggregate (Traditional): Control

Concept #1 introduced

Concept labelled with Jargon #1

Jargon used to introduce Concept #2

Concept #2 labelled with Jargon #2

Jargon used to introduce Concept #3

Concepts-first: Treatment

Concept #1 introduced

Concept #2 introduced

Concept #3 introduced

Jargon #1,2,3 introduced

Study Design

Control (Aggregate)

n=229

Jargon included

Content-related material

Worksheet, mini-lecture, clicker Qs, worksheet
~ 35 minutes

In-class post-test
10 minutes

Treatment (Concept-first)

n=231

Jargon-free

Introduced to jargon

Pre-class: Reading
& quiz
(~1 hour)

In-class:
3 minutes

Data Analysis: all post-test data of students who did the pre-reading
(n=42 control, n=42 treatment; populations equivalent based on prior midterm.)

Analysis: Questions & Measurements

1. Can students better **recognize** correct concepts and jargon?

Multiple-choice Qs, with and without jargon

2. Can students provide better **explanation** of concepts, and **use** of jargon?

Short-response Qs – no jargon in stem.

3. Do students **prefer** the concepts-first or the aggregate approach?

Student survey

Analysis: Questions & Measurements

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Student survey

Topic: Genomes & DNA structure

Why chosen?

- Area of student struggle
- New unit in the course
- New jargon to students

Topic

Jargon assessed in this topic

Jargon

Substitute term

Explain why the structure of DNA is less stable when there is a mutation.

Purine

Large base

Pyrimidine

Small base

Stacking interaction

Hydrophobic interaction

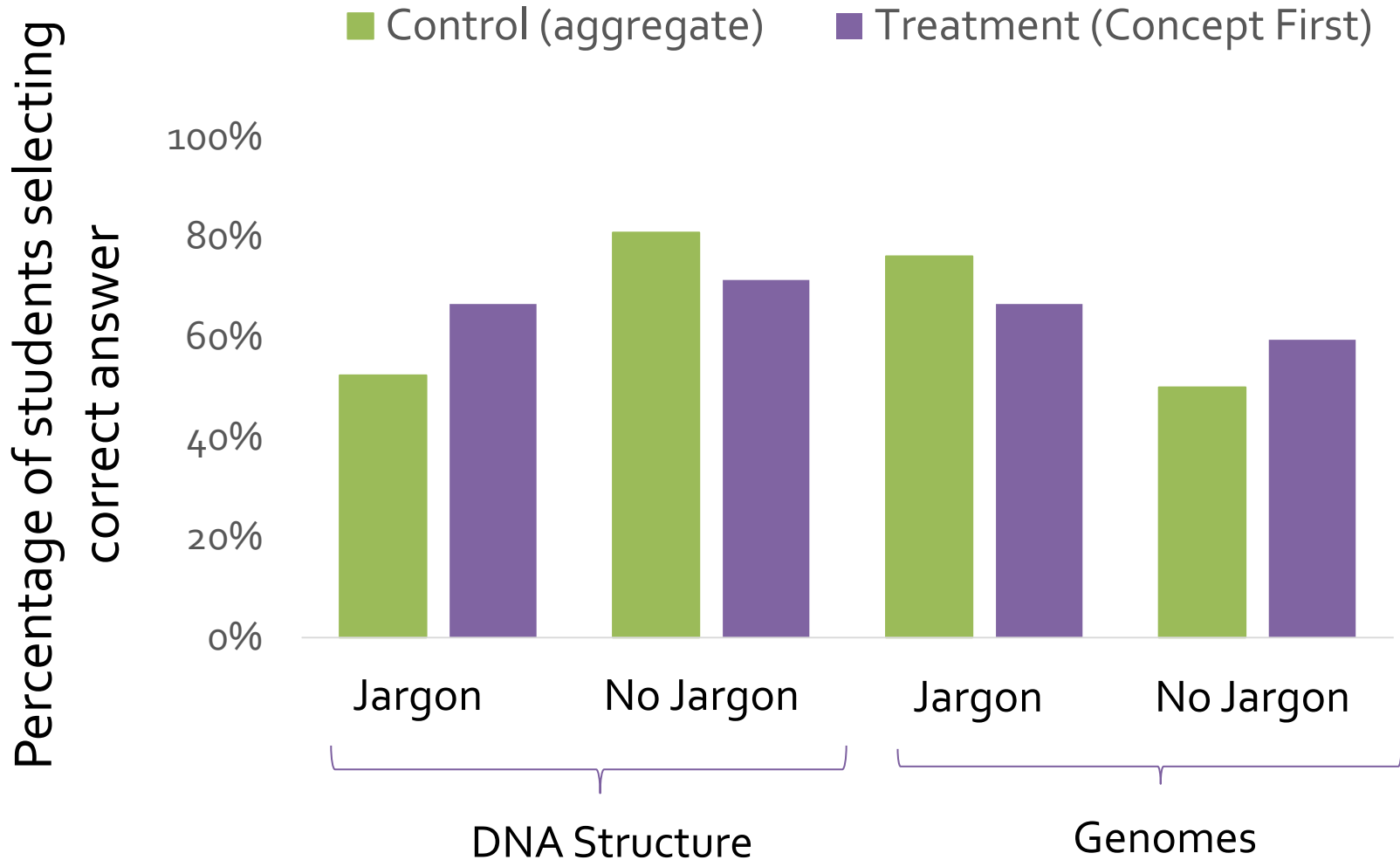
Identify and explain what a genome is.

Genome

Total hereditary genetic material

Results:

1. Multiple choice - No difference



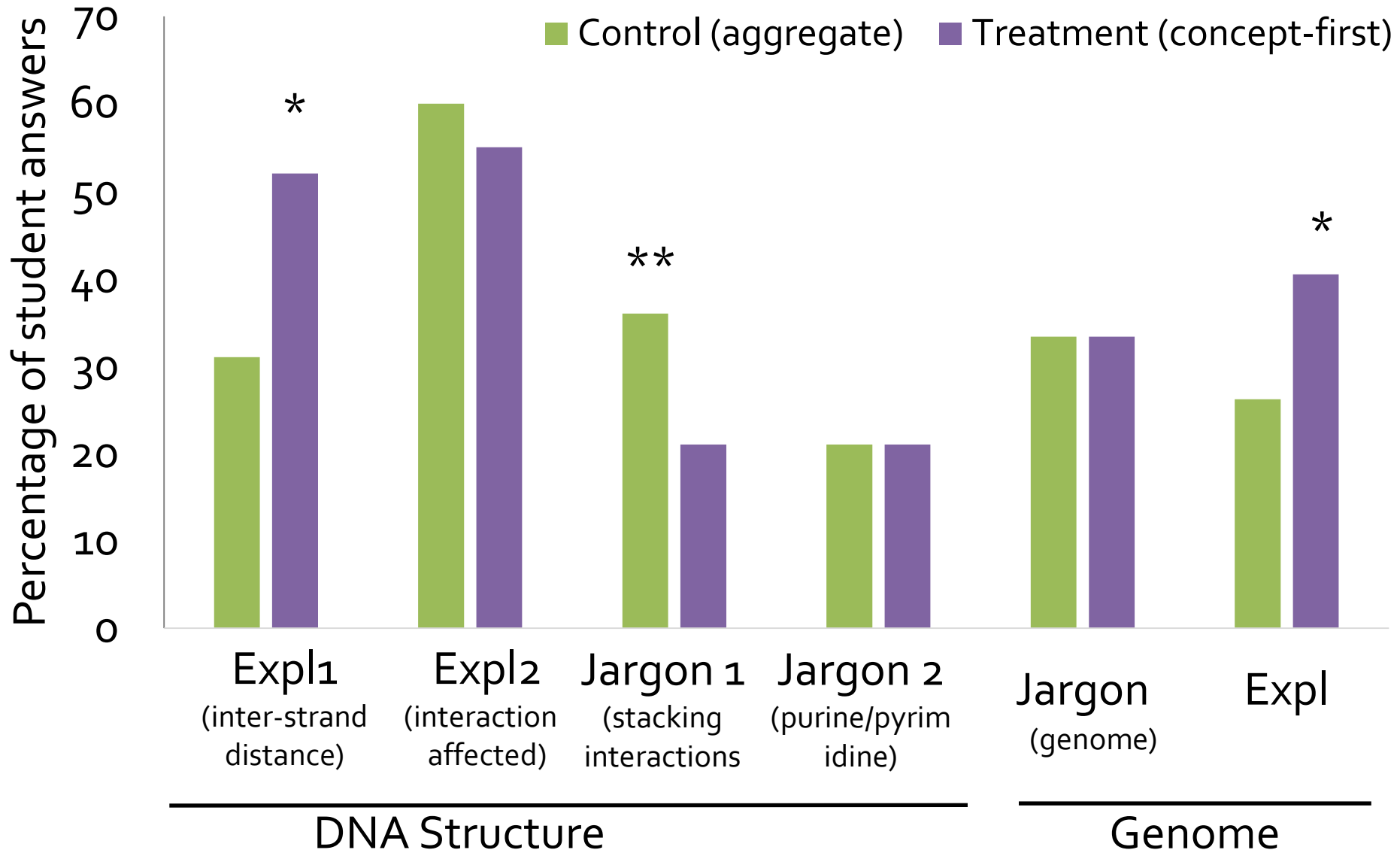
2. Open-Response Question Analysis

With rubric, blind-reviewed subset of responses to determine what jargon and explanations they used

Identified alternate common correct explanations, and expanded rubric accordingly. Re-reviewed responses.

Scored correct use of jargon and a variety of correct explanations
>95% IRR, all differences resolved

2. Open-Response Questions

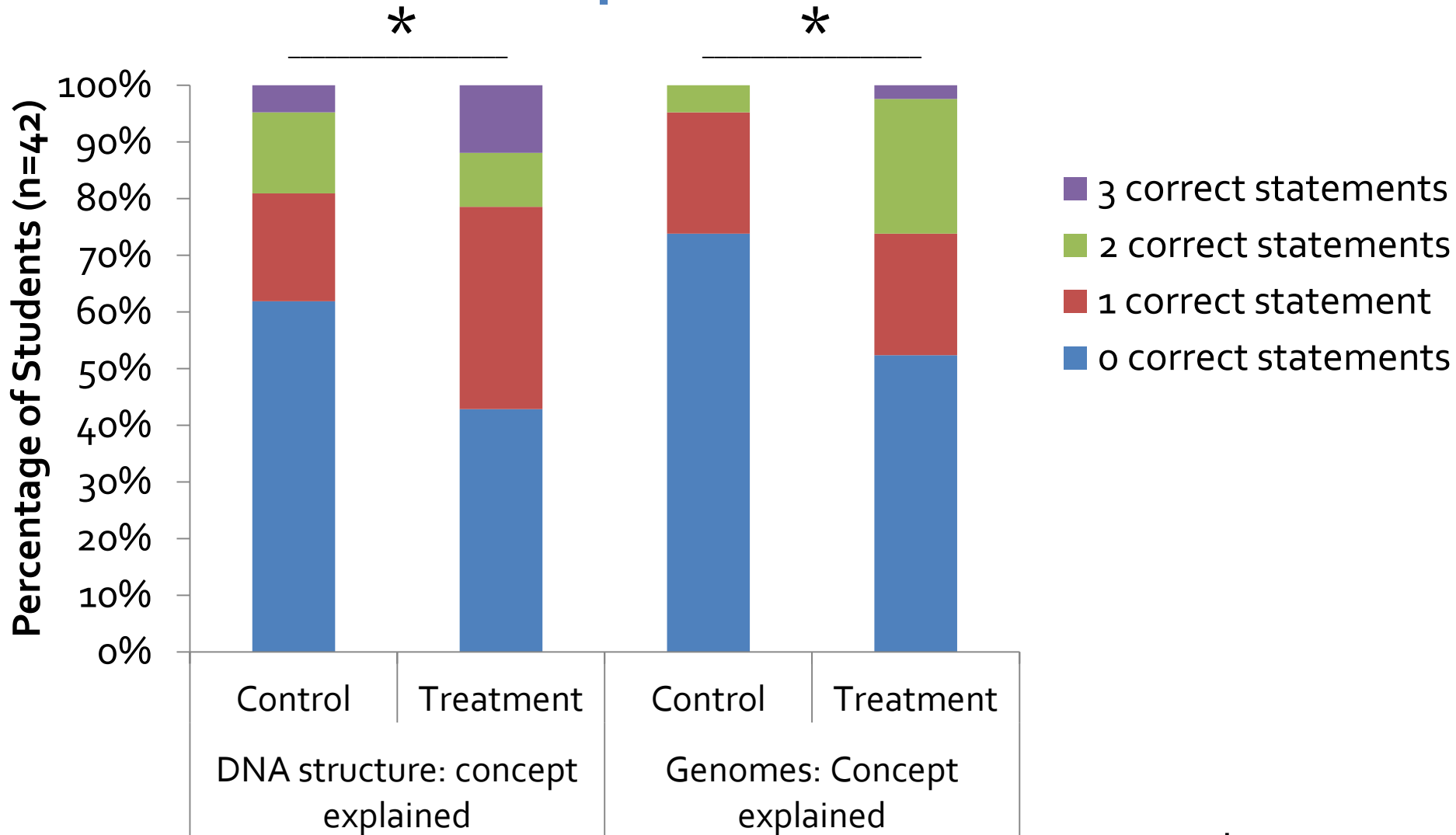


Expl = explanation

* $p < 0.05$

** $p = 0.05$

2. Treatment group provided more explanations overall on open-response questions



* $p < 0.005$

Conclusions and Possible Implications

1. No difference in ability to recognize correct jargon/concepts

Assumption that students understand concept if selecting correct answer, but was not the case in SA responses.

2a. Variation in correct use of jargon (only one out of 3 terms showed difference between treatment/control).

Differences could relate specifically to topic – accessibility of jargon, prior exposure...?

2b. Increased correct explanations of concepts overall.

More comfortable with descriptive language? Less cognitive load without jargon use.

3. 60% of surveyed students found it preferable to learn new material in a concepts-first manner

Could investigate interactions between concepts-first approach and ESL?

Future Directions

- Consult students to re-consider identification of jargon and topic prior to study
- Increase sample size
- Implement key component of intervention in face-to-face time, rather than before class
- Broader assessment to investigate differences between different jargon/topics
- Longer experiment

Many thanks for...

Support from course instructors:

Sunita Chowrira, Carl Douglas, Marcia Graves,
Ehleen Hinze, Karen Smith

Discussions on study design & analysis:

Laura Weir, Martha Mullally, Trish Schulte

Further questions/ideas – please contact us:

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Analysis

Cohort: Students who completed the pre-reading prior to quiz (self-reported)



- A – I read all of the pre-reading before today's pre-quiz**
- B – I read some/most of the pre-reading before today's pre-quiz
- C – I skimmed the pre-reading before today's pre-quiz
- D – I first opened the pre-reading while I was doing the pre-quiz
- E – I didn't read the pre-reading for today

Resulting cohorts:

Aggregate (Control): n=42

Concepts-first (Treatment): n=42