

Supplementary 4

Jigsaw Activity Primary Research Article in Immunology

The context and procedure for activity implementation:

This activity was performed three times during a block schedule May-term immunology class (three hours per day for 18 days). This course is an elective for biology and biochemistry majors. Each time this course is taught, there are a maximum of 20-24 students. This course has an interesting construction with a seminar feel. The majority of the points in the course come from student-led discussions, responses to case studies, and article summaries. The jigsaw and discussion of journal articles and then subsequent written summaries are worth 30% of the student's grade. This activity was implemented to improve the student's ability to read, integrate, and assess primary literature as well as communicate their findings while also collaborating with peers. The students focus on one aspect or figure from the paper and then learn about other parts of the article from their peers before integrating the information into a written article summary. The students were given instructions and guiding questions for the jigsaw and written article summary.

Choice of article: Articles were chosen based on increasing difficulty level and important discoveries or relevance to current world events.

Assessment: See Assignment Below

Example Student Instructions

Please use these instructions:

Part 1: Introduction (Before Class)

- a. Read the paper provided by the instructor
- b. Identify ten terms you do not understand and define them.

Part 2: Jigsaw

a. Phase I: Initial Groups

- i. Each group will receive a portion of the paper
- ii. Students in the initial groups will be responsible for learning their assigned figure along with the relevant necessary introductory material and conclusions.

1. Guiding questions:

- a. What are the overall objectives of this paper?
- b. What background information would be necessary for someone to understand this figure(s)?
- c. What question is this figure trying to address?
- d. What are the controls, both positive and negative?
- e. Explain the assay and how it addresses the question.
- f. Are there any critiques for this experiment: missing controls, better statistics, additional experimentation?

- g. Highlight the conclusions and incorporate the important discussion associated with the figure(s).
- iii. Prepare for peer teaching with an outline or presentation.
- b. **Phase II: Peer-Instruction**
 - i. Assigned to new groups with individuals who understand the other figures.
 - ii. Teach the answers to the guiding questions from your figure(s) to your peers.
 - iii. As a whole group, come to an understanding of the paper.
- c. **Phase III: Whole-Class Discussion**
 - i. Be prepared to share information about your figure, including related introduction and discussion information.
 - ii. Where should this research go from here (next steps)?
- d. **Assessment:**
 - i. A possible assessment of a group presentation over the entire article.
 - ii. A written article summary, see the instructions below.

Part 3: Assessment Article Summary

Purpose: Gain Experience synthesizing scientific literature content and thinking critically about the content of the paper

Instructions: For this assignment, you will use the article you just read and presented with your peers. You will write a summary of the article. You are not expected to be an expert in the field; however, you are expected to demonstrate the understanding necessary to summarize your article. If you start early, you can bring what you have completed, and I will give you feedback. The written summary is based on the directions in Chapter 7 of Pechenik (p. 121-125, 9th edition). The summary should be no more than two pages, double-spaced, no larger than 12 pt font. Have the full citation below your name on the top of the first page.

The assignment will be **graded** on clarity, content, and format (length and grammar).

Article Summary Questions (Adapted from pg 122 Pechenik 9th edition):

1. Why was the study undertaken? (where to find: intro and discussion)
2. What specific questions were addressed? (where to find: figures and tables)
3. How were these questions addressed? (where to find: methods, figures, and tables)
4. What assumptions did the researchers make? Are they testable? How are they testable? (full paper)
5. What are the main findings? (where to find: results, figures, and tables)
6. What questions remain? How were the results integrated within the field? (where to find: results and discussion)
7. What did you find interesting about the paper? What did you learn?

Pechenik, Jan A. "A Short Guide to Writing about Biology". 9th edition. Pearson (2016). ISBN-13: 978-0321984258

Rubric:

	Level 1	Level 2	Level 3	Level 4
Comprehension and response to the article (Thinking/ Inquiry)	Student lacked clear understanding of the article and may or may not have expressed a personal response.	Student demonstrated some understanding of parts of the article or did not express a clear personal response.	Student demonstrated considerable comprehension of the article and articulated a thoughtful response.	Student demonstrated clear comprehension of the article and articulated a thoughtful response.
Summary for Article (Knowledge/ Understanding) Summarize the main ideas and facts in the article.	No summary is provided, OR the text is provided verbatim. Author and source are not named.	Some details from the article are missing. Summary is not objective OR minimal referencing to the article is provided. Author OR source is not named.	Most of the main ideas and facts from the article are included. Summary is presented objectively, and referencing to the article is provided. Author and source are named.	All main ideas and facts from the article are included. Summary is presented objectively and referencing to the article is provided. Author and source are named.
Communication (communication and collaboration)	Student's writing is disorganized and main points of article are missing.	Student's writing is somewhat disorganized and missing some main points of the article.	Student's writing is organized and highlights most of the main points of the article.	Student's writing is organized and highlights the main points of the article.

<p>Conclusions (Application)</p> <p>Provide personal comments pertaining to the article and how it relates to the course material.</p>	<p>No personal comments are provided. No relationship between article and class material is provided.</p> <p>No references to course material are given.</p>	<p>Few personal comments. The student demonstrates some working knowledge of class material relative to the article.</p> <p>Few references are made to the course materials.</p>	<p>Personal comments are clearly stated. Student clearly demonstrates a working knowledge of class material relative to the article.</p> <p>Some references are made to the course materials.</p>	<p>Personal comments are clearly stated. Student clearly demonstrates a strong working knowledge of class material relative to the article.</p> <p>References are made to the course materials.</p>
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