

Using Problem Based Learning for Assessment in Large Classes: Triple-Jump

Erika Kustra, Centre for Teaching and Learning, University of Windsor

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<http://www.glos.ac.uk/ceal/resources/casestudiesactivelearning/activelearningcasestudies/casestudy7.cfm>

Context:

Course: Biochemistry (~ 1990s)

Instructor: Luis Branda, McMaster University, Professor Emeritus

In a large, required, undergraduate course in Biochemistry (over 300 students), Luis Branda used a variation of Problem Based Learning called the “Triple-Jump”. The goal was to engage students in their own learning, in a format that allowed for individual assessment. The skills required included: analyzing a problem; identifying important issues and questions; researching one of the most important issues; summarizing, analyzing and evaluating the literature; communicating findings in writing; and then evaluating the work in the light of new information. As a student who experienced the process, it was one of the first bright lights in my undergraduate experience - introducing me to the excitement of research and searching for my own answers. This is my memory of the process.

Process:

First students experienced the novel triple-jump process as an exercise, and then repeated a new triple-jump for a grade, equivalent to a midterm exam.

Step 1: Class 1 (50 minutes)

1. Each student was given a paper problem, based in Biochemistry. The case was based in the real world and linked to a health issue, such as a sick infant.
2. Individually, students read the problem and tried to identify in writing all the issues and questions elicited by the problem.
3. Students were then asked to identify one of the above issues as the most important issue to solve or understand the problem, and give rationale for the choice. This would be the question that they would research,
4. Students captured their work on paper that allowed two or three copies to be made (such as the paper used to create triplicate forms).
5. Two copies of students' responses were handed in to the teaching assistants, and one copy was kept by the individual student to refer to during research.

Step 2: Research between Classes (1 to 2 nights)

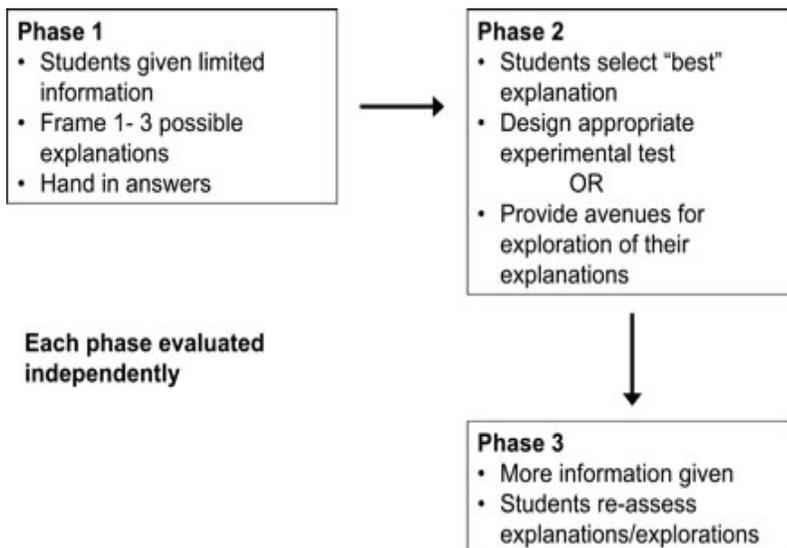
6. Students researched the case to find answers to the issue that they individually identified. Sources such as textbooks and journal articles were encouraged. (The library should be notified in advance about the large group of students.)
7. Collaboration was allowed during the research period.

8. During this time, the teaching assistants and professor grouped the student submissions from Step 1 into similar themes based on the 'important issue' each student identified. A new question related to each theme, with some additional information about the case, was attached to each student's writing. The goal of the new question was to assess the knowledge and thinking gained during the students' research.
9. Possible Alternative: Have one sheet with all of the questions included and instruct students to choose the most relevant question to answer based on their initial 'important issue'. In this case, every student receives the same information, and less time is required for picking up papers. It would not be necessary to return the students writing to them if they were instructed to bring their own copy back to class with them.

Step 3: Class 2 (50 minutes)

10. In the lecture hall, each student's previous writing was arranged alphabetically for pick up.
11. Individually, students answered the question provided by the instructor, based on their research between classes.
12. The students were asked to evaluate their original issue and their current answer in the light of the new information provided in this third step.
13. The final written responses were submitted at the end of the class.

The process is a modified version of the Triple-Jump designed by Rangachari (2002).



Evaluation of the Triple-jump was based on:

- a) quality of issues identified
- b) rationale behind the selection of the most important issue to research
- c) quality of response to the test question (indirectly also a measure of the quality of research and analysis of literature findings)
- d) ability to evaluate your own work.

Instructor Preparation:

- a) Write an initial case, possible follow-up questions and additional information.
- b) Prepare a rubric for grading the responses.
- c) Notify the librarians and ensure that there are appropriate resources available and they are prepared for a large number of students.
- d) Arrange for triplicate paper for the students to write their responses.
- e) Coordinate with TAs to sort the student responses into themes based on the 'important issue' they identified.
- f) Refine test questions for each of the themes (my guess is that there would be ~5 common themes and a few outliers, and most questions could be written in advanced based on expected responses). With help of TAs, attach the questions to each student's paper (using different coloured paper for each question would help make it easier to identify themes later).
- g) Separate the duplicates of each student's responses to keep one version and return one version. Organize papers alphabetically for students to pick up in class.
- h) Explain marking rubric to TAs for the written responses. The actual time to grade the papers would probably be about the same as an exam with short answers.

The process of the large class triple-jump was effective from the perspective of students, in that it was memorable, and appeared more connected to real life. Anecdotally, 20 years later, students I have spoken to still remember the experience, the process and some of the content they learned.

For an alternative variation on a triple-jump, please see: <http://www.bambled.org/cgi/content/full/30/1/57>

Relevant References

Rangachari, P. K. (2002) The TRIPSE: A Process-oriented Evaluation for Problem-based Learning Courses in Basic Sciences, *Biochemistry and Molecular Biology Education*, 30 (1), 57-60.

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