

## Using a Mini-Symposium to Display the Results of Team-Designed Experiments to Encourage Freshman Pride and Teamwork

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First semester freshmen tend to view themselves as students only, not as new members of the scientific community. To encourage the students to work together and take pride in their own work, I have established a yearly mini-symposium in which the first semester biology students present an abstract (with up to two figures and tables) reporting the results of a team-designed experiment. What has made a difference in the spirit of this lab is the mini-symposium, which is held with the formality and look of an actual scientific symposium. This paper presents how to implement a mini-symposium to make a semester-end experience for beginning biology students within the community of a biology department.

At Saint Joseph's University, the BIO 1011 Laboratory is taught in 11-12 sections of 18 students per section with students working in lab teams of three (five or six teams per class). The overall enrollment has been 200-220 students, most (but not all) are freshmen biology or environmental science majors. Teams are chosen early in the semester and the students work in their team for all the class experiments that semester. For the mini-symposium project, each team works together to design, conduct, and prepare an abstract for a short experiment investigating the effect of some factor on enzyme activity. Typical experiments chosen by the students adjust the temperature or pH at which the activity was measured, alter the conditions at which the enzyme was stored for a period of time, expose the enzyme to harsh conditions (boiling, freezing), change the substrate (different alcohols for alcohol dehydrogenase), or modify enzyme, substrate, or inhibitor concentrations. We provide three different enzymes for the students to pick from, to encourage variety in experiments.

The team experiment follows a typical enzyme kinetics laboratory. In that experiment, the students modify the enzyme concentration and then modify the substrate concentration to see the effects of each change. Students carry through the calculations to determine  $K_m$  and  $V_{max}$  for the substrate experiment. They are also introduced to buffers and prepare buffers of different pH by mixing different volumes of phosphate buffers. A workable schedule has been: (1) Devote one lab period to the enzyme kinetics lab and buffers. (2) In the following week's lab, discuss calculations and give the students time to finish their enzyme kinetics calculations with help in class. Teams begin to plan together their team experiment. (3) In the third week, teams conduct their team experiment in one lab period (3 hours). Student teams must submit an "equipment request" at least one day before their lab to request items needed for their team's experiment. It is often this equipment request that is the catalyst for ideas about what to do in their own experiment, as they see what options are available.

The symposium abstract is styled after professional scientific abstracts with the title followed by the authors' names, department, and institution. The emphasis is that this is indeed a symposium and they are presenting their own scientific work as do scientists. The students receive a detailed instruction sheet about how to prepare their abstract. They can include up to two tables and figures. Most use word processing and spreadsheet/graphing programs to prepare their abstract (training in these are included at some earlier lab sessions), although hand-drawn graphs were also accepted. They submit two copies of the abstract. One copy is used for grading by the instructor. The students can revise and re-submit the abstract before the symposium. If they do not revise, the original abstract is displayed. This procedure has ensured that all teams do have an abstract on display. The mini-symposium is held the final week of classes (last day of class, reading day, and finals week) in the regular lab rooms. Abstracts are displayed on boards (on easels) by "session" (subject area) as formally as in professional scientific meetings. All students, faculty, staff, and the students' friends and families are welcome to attend. The rooms are open for browsing and snacks are provided over the days of the mini-symposium to encourage visitors to linger and to return at other times.

The benefits of this mini-symposium and team project have been to encourage pride in their work and to encourage teamwork. It is their own experiment -- not just a lab exercise.

Students are able to show their accomplishments in basic experimental design, scientific writing, and computer skills. It also encourages a bond with the upperclassmen, because these students return to see what the freshmen this year have done. TAs visit and read the abstracts of the students they have taught. We have also extended the mini-symposium into a "joint symposium" with the upperclassman Advanced Cells class. The upperclassmen present a full poster with a full abstract in the program as well as an oral presentation on the first day of the symposium.

Some keys to the success of the team project and mini-symposium have been to ease the pressure on the students, to pay attention to the look of the symposium, and to encourage attendance. To ease the pressure on the freshmen participants, the abstracts are enlarged for them and some "creative repair" used to make all abstracts have the correct title format and to generally look good when displayed. The abstract is worth only one fourth the amount of one lab report; this small grade value has reduced team conflicts to a large extent. The presentation of the symposium includes posters and programs that show the authors and titles for all abstracts. An extra effort to proof all student names in the program against the class list has helped avoid having disappointed students (who had their name misspelled by their teammates on their submitted abstract). Attendance has been encouraged by having refreshments and requiring all BIO 1011 students to visit the mini-symposium at least once (a 10 point assignment) and fill out a "question card." A guest book shows the students which deans and faculty members have been by to see their work.

Overall, the annual mini-symposium for the beginning biology students -- with an opportunity to present their team's own experiment -- has given us the opportunity to encourage them and welcome them into our biology department's community.