Pitching a Research Proposal: Dragon’s Den

3594a: Genome organization, mutagenesis and DNA repair

With the advances in technology in recent years, the techniques used in most fields of applied sciences are getting more and more sophisticated. Students in upper year science classes, specifically genetics, are usually taught these techniques in their lectures and sometimes the use of these techniques are also demonstrated in lab courses. However, as the students’ progress to their graduate studies or research-related jobs after obtaining their science degree at Western, they often come to the realization that the appropriate implementation of these techniques within a rationalized experimental design was not successfully learned. As graduate students we have faced these problems ourselves and understand first hand that this is a problem that, if fixed, can lead to a successful transition into research based careers.

As teaching assistants, we decided that a potential solution to this problem would be an interactive tutorial where the students take charge of designing a rationalized experiment centered on using one of the key techniques used in modern genetics. This would help the students gain a broader/applicable view of the concepts taught in the course. Teams of students would identify a problem; act as experts from the perspective of the stakeholders they represent and pitch a proposal, seeking funds for the research, to a panel of experts (guest professors/graduate students) in a Dragon’s Den format. The students are expected to successfully defend their proposal and convince the Dragons that their experimental design that will be innovative, feasible as well as applicable and will address a key scientific issue at hand. This will improve the students’ ability to perform at multiple levels of Bloom’s taxonomy.

**Learning objectives**

- Identify current scientific issues that need to be addressed immediately.
- Formulate a clear and logical experimental design and obtain a complete understanding of the scientific techniques taught in the course.
- Gain experience doing research outside of the scientific/technical field (legal, economic, and ethical factors).
- Work as a team to bring together a coherent stance.
- Practice effective communication and presentation skills.
- Gain experience in clearly and effectively answering questions.

**Assignment Outline**

Each group (5 people) in the class will be involved in presenting a research proposal using genetic/genomic techniques from the course’s lecture and tutorial materials. Topics presented in these tutorials will provide the beginning of our final exam preparation as we
navigate relevant and current advances in the field of genetics. Many of the underlying methodologies of these proposals will be tested on the final exam in the form of short answer or short essay questions.

Each pitch will last 15 minutes in length including questions.

The first four members of the group would have the following roles. This comprises the team’s experts:

- The Researcher
- Patient or Citizen (depending on which fits best with topic)
- Genetic Counselor or Farm Owner (depending on which fits best with topic)
- Representative from Private Industry or Technologist

Any additional member of the group should assume a role of a new relevant and creative stakeholder (e.g. family member). All roles should be clearly indicated with a sign including the panel member’s name, role and the company, employer or area of society that they represent. Dressing up to match your role is highly encouraged!

Outline of your pitch:

**Introduction:** 30 seconds to introduce the presenters, 2 minutes to present the problem and pose a question and 1 minute and 30 secs to give some background information about the question at hand.

**Rationale and Hypothesis:** 2 minutes to hypothesize and provide a justification for your hypothesis.

**Experimental Design:** 3 min to propose the design of your experiment, describe the method and state how much funding you will require and why.

**Impact:** 1 min to state the impact of proposed research and the concluding remarks.

**Questions from the Dragons and Audience:** 5 mins

The group takes the responsibility of assuring at least 2 minutes of talk time per member. (may not be continuous). Students will be encouraged to organize and rehearse in order to successfully pitch the proposal within the given time.

Keep in mind, although this tutorial is a groups activity, each member of the group will be marked individually based on her/his performance. To succeed, students will have to work
together, be an excellent team player, and lift each other up to present THE STONGEST case possible.

**KEYS TO SUCCESS:** Rehearse, rehearse, rehearse! 1. Research your topic 2. Organize what you will say 3. Strategize with your team!

Techniques to be used for designing your research proposal (one will be allotted to the group by the TAs)

1. RNAseq
2. Illumina (Target Capture)
3. TaqMan qPCR (gene expression)
4. MDGA
5. Human SNP array
6. CGH array
7. Personal genome sequencing

**Note:** This was a successfully implemented tutorial in Bio 3594a. The students were very enthusiastic and highly motivated. Students took great interest in learning the technique they were assigned and came up with innovative and potentially successful experimental designs to address some of the current scientific issues. The topics they chose represented cancer biology, stem cell engineering, climate change and strategies for sustainable agriculture. We invited our peers who were towards the end of their graduate studies and had first-hand experience in using these techniques to act as Dragon’s and they were very impressed with the level of enthusiasm that the students showed in both teaching and learning. We designed a rubric to evaluate the students’ performance at different levels of Bloom’s taxonomy. We believe that with a few modifications the idea of this tutorial can be applied not only in Science but also in various disciplines of university teaching.

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