Abstracts

Education

Program/Abstract # 77
Designing an effective poster: How to emphasize your message
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This poster is the first of two designed to help you develop a presentation that successfully emphasizes your science and its importance. This poster relates good practices for generating a presentation that is convincing. The second poster relates the dreadful consequences of common bad practices. Designing a good poster requires you to think of what your audience needs most to understand your science: simplicity, clarity, emphasis. A good poster develops a SINGLE message. Moreover, the poster is clear: all its elements are marshaled to emphasize your message. Your message is not swamped by extraneous detail. You may be tempted to use a publication format, but simply supplying pages from a paper is clearly ineffective. The elements that convince in a paper require a big time investment from a reader but, at poster sessions, your audience lacks time to consider details. A poster requires a different design. For an effective poster, your presentation must be visual. Avoiding telling in mind-numbing detail: You must show. Express your points in graphical terms. Use figures. Use color-coded graphs that do not need keys to understand. Guide the viewer by using a visual logic, a hierarchical structure to emphasize main points. Avoid visual chaos, with distracting organization. Instead, display the essential content in the title, main headings and graphics. Remember that essential content is not the methods or the detailed data: Essential content is the conclusion of each experiment. Indicate the relative importance of elements graphically: BIG is important; small is unimportant (and can likely be discarded). Make your message obvious and memorable even from a distance, to attract and convince.

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Program/Abstract # 78
Designing an ineffective poster: How to obscure your message
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This poster is the second of two designed to help you develop a poster presentation that successfully emphasizes your science and its importance. The first poster relates good practices for generating a convincing presentation. This poster relates practices that are common but dreadful. If your motivation is to celebrate your work, view these examples as avoidable pitfalls. Designing a good poster requires you to consider what your audience needs most to understand your sciencesimplicity, clarity, emphasis. To design a poster to prevent your audience from understanding your science, you must avoid all these qualities. First, make your poster complicated. Present all the data you ever produced, relevant or irrelevant. Plaster the entire poster surface with words. Use complex tables without legends. Use complex graphs but hide the keys. Scatter figures at random. Second, be obscure. Avoid explaining data or conclusions. Raw data is best. Maybe post pages from your lab book! In a conclusions section, merely list the data again and let the audience interpret the date themselves. Third, avoid emphasis. Make all type the same size. Or use headings that are useless, e.g. Method #1. Avoid using color to emphasize: better yet, randomly use every color available in the PowerPoint pallet. If you cannot avoid emphasis, then emphasize the irrelevant. For instance, emphasize the background: swirls of chartreuse and purple distract well. Emphasize small details with huge typeface; hide important statements with tiny type. Better yet, simply omit anything worthy of emphasis. Make your message so obscure and forgettable that it repels and confuses your potential audience, even from a distance.

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Program/Abstract # 79
Using writing to teach developmental biology, using developmental biology to teach writing
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Writing at the University of Redlands is taught via a Writing Across the Curriculum program. Students complete two writing-intensive courses, one at the lower level (WA) and one in the junior or senior year that concentrates on writing within the major discipline (WB). Both are taught by faculty of all disciplines who are trained in a three day workshop. Biology 348, the upper division developmental biology course, is taught as a WB course. A variety of writing assignments are used. Students are evaluated at the start of the semester by writing on both scientific and non-scientific topics. They write one full lab report, with revision, with other lab reports concentrating on specific writing skills often deficient in student reports. They also write a term paper discussing two primary sources in detail. This paper is peer reviewed and revised. Students collaborate in groups of four to deliver 80 minute lectures based on the chapters corresponding to these topics. There is also a journal club component in lecture, with a writing exercise designed to teach...
Eukaryon: The use of an undergraduate scholarship journal to strengthen inquiry-based pedagogy and a community of undergraduate scholars
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Undergraduate research and inquiry-based pedagogy are becoming increasingly crucial components in colleges and university curricula in the United States. Providing undergraduates the opportunity to publish their scholarly work serves as a pedagogical tool to increase scientific literacy and motivation for scientific careers. Spurred by an NSF-CCLI grant in 2004, the Lake Forest College Biology Department accordingly developed a peer-reviewed undergraduate research journal of life science scholarship, Eukaryon (http://www.lakeforest.edu/eukaryon). In each annual issue, Eukaryon publishes scholarship in any sub-discipline of the life sciences that students have produced within the department’s research-rich undergraduate classrooms and faculty labs. Here, we detail three aspects of the journal’s development: 1) how it is exclusively governed, published, and financed by undergraduates; 2) how the journal establishes and improves on its content and format; and 3) specific strategies that maintain publication selectivity and integrate the journal with student course work and faculty/student collaborative scholarship. Finally, we will discuss how assessment of our journal’s initial impact on a department’s curriculum and its community of student scholars is shaping future directions for journal growth and curricular outcome. We encourage the adaptation and implementation of such journals at undergraduate institutions that seek to further strengthen their community of students as scholars and their inquiry-based pedagogy.

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A semester-long project related to the evolution of developmental mechanisms: Exploring the benefits for undergraduate students at a small liberal arts institution
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It is important to provide undergraduate students with research experiences so that they obtain a deeper understanding of material as well as acquire problem-solving skills that are essential for any career. However, this can be difficult to achieve at a small liberal arts institution where time and resources are limited. One option is to design a course with a lab component in which students conduct a semester-long project with the potential to share their results with the scientific community. I designed an interdisciplinary course titled Evolutionary Developmental Biology in which students cloned genes from the white urchin, Lytechinus variegatus. All of the assigned genes are known to be essential for development of the larval skeleton in the purple urchin, Strongylocentrotus purpuratus. It remains to be seen if their functions are conserved in other species of echinoderms. The project involved a variety of computer and lab-based skills. It culminated with the students incorporating their DNA sequences into phylogenetic trees that they prepared at the beginning of the semester. Students also wrote review articles about their assigned genes to gain a better appreciation for the significance of the project. Statistical analysis of results obtained from pre and post-tests revealed that the students had a better understanding of basic biological concepts by the end of the semester. Moreover, the students gained confidence in a variety of skills that are essential for conducting research in the field of developmental biology.

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Assaying for goosocoid gene expression in LiCl-treated zebrafish embryos in an undergraduate laboratory
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Differential gene expression can be a difficult concept for many undergraduates to understand and master. In order to facilitate an understanding of this concept, a laboratory experiment was designed to allow students to observe how gene expression of goosocoid (gsc) can change based on the activity of intracellular signaling proteins. Gsc is a gene expressed in the organizer during gastrulation of zebrafish and aids in specifying the dorsal axis. It has also previously been shown that LiCl treatment expands the expression region of gsc and dorsalizes the embryo by inhibiting glycogen synthase kinase-3 (GSK-3), an important inhibitor of b-catenin signaling. Zebrafish embryos were treated with 0.3M LiCl for 10min at 3hpf and later fixed at 8hpf (gastrulation stage). Students then performed an in situ hybridization for gsc on untreated and LiCl-treated zebrafish embryos at 8hpf. Students observed a greatly-expanded area of gsc gene expression in the LiCl-treated embryos compared to untreated embryos. Simultaneously with the laboratory experiments, students were also learning about the role of b-catenin signaling and its transcriptional activation of dorsal-specific genes, such as siamois which ultimately upregulates gsc expression. The laboratory experiment examining the expression of gsc in untreated and LiCl-treated embryos allowed for the students to observe, first-hand, a very important principle in developmental biology, differential gene expression. They were able to successfully understand WHY the expression of gsc could change based on the activity of GSK-3 (and ultimately b-catenin).

Teaching research skills through collaborative research projects in developmental biology
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Students learn many scientific research skills in undergraduate biology courses, especially those with laboratory components. Although elements of experimental design, data collection and analysis are possible with short experimental projects during the course of a semester, the responsibility for all aspects of the project and independent thought on the part of the students are often lacking. An upper level elective course that allows student groups to design and carry out projects over a greater time span promotes application of multiple skill sets and independent original research. Introduction to multiple model organisms, experimental design, microscopy and imaging, data collection, and lab notebook maintenance are integrated early in the curriculum through single week