Resources for PBL in Introductory Sciences

Published collections

Case studies

National Center for Case Study Teaching in Science: includes cases studies of all different formats; many different fields; teaching resources included (like ppts); (http://sciencecases.lib.buffalo.edu/cs/)

Webpage created by Peter Ommundsen: has instructor and student explanations of how to use/complete case studies; includes 20 case studies to use and a student worksheet; http://capewest.ca/pbl.html

Teaching Modules and other Materials

SERC (the Science Education Resource Center at Carleton College): a wealth of information regarding pedagogy, course design, discipline specific resources (Biology, Chemistry, Computer Science, Economics, Geoscience, Physics, Mathematics, Interdisciplinary); has a resource for teaching introductory classes; http://serc.carleton.edu; a great example of how projects are used in Earth Sciences Courses at UW- Madison: http://serc.carleton.edu/NAGTWorkshops/gsa03/activities/1885.html;

TIEE (Teaching Issues and Experiments in Ecology): peer-reviewed materials that can be used in lectures or labs (http://www.esa.org/tiee/); includes instructor notes, student instructions, data, presentation materials (powerpoint); highlights key student-active approaches (e.g., think-pair share, guided discussion)

QUBES (Quantitative Undergraduate Biology Education and Synthesis): promoting quantitative education; includes Faculty Mentoring Networks; a hub of collections, metrics, etc.; https://qubeshub.org/

Dryad Digital Repository: makes the data behind scientific publications usable and explorable; http://datadryad.org/

Dryad Lab: associated with the site above but has teaching modules around a few of the data sets; http://datadryad.org/pages/dryadlab

SENCER (Science Education for New Civic Engagements and Resposibilities): a variety of information including their Model Series which describes model courses and their course design, learning outcomes, strategies, activities, and assessments; http://www.sencer.net/index.cfm

EcoEdDL: a digital library organized by Ecological Society of America; includes photographs, publications, activities and assignments; many of the posts are not discipline-specific (e.g., building a learner-centered community on day 1); http://ecoed.esa.org/index.php?P=Home

Education & Research Networks

EREN (Ecological Research as Education Network): students collect data and collaborate on projects around the world; standardized data collection protocols to follow; instructor materials provided; access to large data sets; potential to be a coauthor on publications or create your own collaborative study; http://erenweb.org/

CUREnet (Course-based Undergraduate Research Experience): a network of a diverse set of projects and resources in chemistry, biology, biochemistry, bioinformatics, and geoscience; assessment resources; professional opportunity to design and build a featured project; https://curenet.cns.utexas.edu/

Science Education Alliance (SEA): through HHMI (Howard Hughes Medical Institute); provides models of authentic research to the university laboratory setting; current feature is SEA-PHAGES (Phage Hunters Advancing Genomics and Evolutionary Science); http://www.hhmi.org/programs/science-education-alliance

Additional tools

HHMI Spreadsheet Analysis Tutorials: teaches students how to use Excel spreadsheets for data entry, calculations, and simple or descriptive statistics; http://www.hhmi.org/biointeractive/spreadsheet-data-analysis-tutorials

Using Large Data Sets for Teaching: this information (by Tom Langen) provides reasons for using large data sets in inquiry-based classes; it also lists exercise examples, data source recommendations, and links; https://groups.nceas.ucsb.edu/big-data/workspace/public-files/Overview%20of%20the%20Pedagogy%20of%20Large-Scale%20Data%20-%20Data%20Archives.pdf , https://groups.nceas.ucsb.edu/big-data/front-page, http://onlinelibrary.wiley.com/doi/10.1890/1540-9295-12.6.362/epdf

Concept Inventories

ASBMB Concept Inventory List: a list that has links to multiple concept inventories within biochemistry, biology, chemistry, math, physics, and the nature of science; https://www.asbmb.org/uploadedFiles/Education/TeachingStrategies/Concept_Inventory/Concept%20Inventories%202%202%202015.pdf

Q4B Concept Inventories: has a number of validated concept inventories available for topics including experimental design, meiosis, population dynamics, transcription, etc.; http://q4b.biology.ubc.ca/concept-inventories/

Concept Inventories/Conceptual Assessments in Biology (CABs): this is an annotated list of information (articles, inventories, etc.) that can be used for a wide range of topics; http://go.sdsu.edu/dus/ctl/cabs.aspx

Scaffolding student learning: this is a link to a quick how-to article written by Vicki Caruana in *Higher Ed Teaching Strategies*; the article links to a few examples; http://www.facultyfocus.com/articles/instructional-design/scaffolding-student-learning-tips-for-getting-started/

CATME (Comprehensive Assessment of Team Member Effectiveness): a tool to create teams and administer self and peer evaluations; easy to use, distribute, and interpret; provides feedback and support materials to students on how to be effective team members; www.catme.org

Project Design Rubric: by the Buck Institute; this is a tool for instructors to help them craft projects in the classroom; http://bie.org/object/document/project_design_rubric

Don't forget to look to your field's research literature: Identify (or have students read and identify) current problems that may serve as the focus of a larger project