

Expanded Teaching Notes

Example from “*Who Owns the Geritol Solution?*”

| Class session/ problem stage | Driving question(s) | Content themes | Student activities & responsibilities | Instructor roles & responsibilities |
|--|---|--|--|--|
| Session 1/Stage 1 | Stage 1: (1) How does the Geritol solution work? (2) How does one design mesoscale-sized experiments in a natural setting | Stage 1: Greenhouse gases and evidence for global warming; CO ₂ and photosynthesis; photosynthetic pigments; marine food webs; global carbon cycle, including role of marine producers, consumers, and decomposers; assumptions of scale on experimental design | <ul style="list-style-type: none"> • Read, discuss problem in group • List/discuss prior knowledge that relates to problem • Develop, prioritize questions that lead to new information • Prioritize, assign responsibilities for out-of-class research • Discuss potential sources | <ul style="list-style-type: none"> • Introductory remarks: situate problem within the context of the course; distribute Part 1 • Observe group discussions • Facilitate (if necessary) development & prioritization of learning issues • Monitor group functioning—sharing of responsibilities and tasks; participation in discussions |
| Students’ out-of-class individual research on question-driven topics | | | | |
| Session 2 & beginning of 3/Stage 1 continued | Stage 1: (1) Would you fund an open ocean test of the Geritol solution? | Stage 1: <ul style="list-style-type: none"> • Refinement and enrichment of student understanding of content issues • Analysis of actual tests of Geritol solution (IronEx and SOIREE experiments) | <ul style="list-style-type: none"> • Reporting on out-of-class research at beginning of 2nd session • Apply & discuss new understanding to problem • Refine learning issues for further out-of-class research | <ul style="list-style-type: none"> • Observe group discussions, whole-class discussions • Mini-lectures as necessary to facilitate, focus student inquiry |

| | | | | |
|--|--|--|---|--|
| Session 3/Stage 2 | Stage 2: (1) Is the Geritol solution a desirable solution for environmental problems? | Stage 2: Commercial use of the Geritol solution for carbon sequestration and fish farming; potential environmental impact; Kyoto protocol; cost benefit analysis of ocean iron fertilization | <ul style="list-style-type: none"> • Application of prior knowledge to new information about commercial use • Develop new learning issues for out-of-class research | <ul style="list-style-type: none"> • Distribute Part 2 in final 20–25 min of class • Facilitate new learning issue development (if necessary) |
| Optional Session 4/Stages 1 & 2 | Concept map: (1) What are the big ideas? (2) How do all of these pieces of information interconnect? | See above for Stages 1 and 2 | Construct maps based on group's current understanding of complex topics | <ul style="list-style-type: none"> • Formative assessment possibility: concept map • If necessary, introduce students to methodology) |
| Session 4 or 5: Problem resolution | Problem resolution: (1) What do we still not understand? (2) How can we do better next time? | <ul style="list-style-type: none"> • Refinement and strengthening of content understanding of Parts 1 and 2 • Assessment of group and individual achievement | <ul style="list-style-type: none"> • Final reporting on out-of-class individual research, discussion of the content, environmental issues • Organize work on group assignment or product: position paper and debate, letter to editor of newspaper or journal, or dialogue • Reflection on the problem-resolving process | <ul style="list-style-type: none"> • Observe group function • Distribution of instructor-identified learning objectives • Mini-lectures if needed to clarify concepts students identify as still poorly understood • Lead whole-class discussions to facilitate connections with previous problems |
| Future individual assessment: Exam questions, essays | | | | |