APPENDICES

for

The Role of Assessment Infrastructures in Crafting Project-Based Science Classrooms

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Doctoral Dissertation

Field of Education and Social Policy — Learning Sciences
NORTHWESTERN UNIVERSITY

EVANSTON, ILLINOIS

June 1999

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APPENDIX A: TEACHER INTERVIEW GUIDES [1]

Teacher Interview Guide for Winter 1994

First Attempt at Interview Questions around Assessment

I. What makes a good project?

First, ask the teachers to have in mind two projects, one that was done really well and one that was done very poorly.

A. Describe to me one of the best projects you've seen so far.
   1. What makes this a good project?
      a. What features does this project have that make it complete (or nearly complete)?
      b. What criteria do you use for evaluating those features? In other words what's the difference between having the feature and having a good example of the feature (e.g. what's the difference between having data and having good data?)?
   2. What could be improved?
      a. What features are missing?
      b. What features are there but could have been done better?

[1] This appendix and the others that follow include interview guides and surveys used by the researcher, as well as copies of handouts and artifacts used by the teachers in their classrooms. In order to meet dissertation format requirements, some changes were made to the format of most of the documents, most notably the margins. Use of emphasis, such as bold, capitals, italics, and underlining, is the same as in the original documents; where possible, the general layout is also the same. In the interest of reducing length, extra spaces that were provided for written responses in the interview guides and surveys have been removed. Instead, only those items reviewed and discussed for this study are shown, and items with repetitive and lengthy formats are illustrated rather than listed in full.

3. We realize that the criteria you would use informally for judging projects might not be the same as the criteria you use for "grading" projects.
    a. What of the features and criteria you have mentioned so far do you use for grading?
    b. Which features do you *not* use that you wish you could?
    c. Which features do you use, but in an instinctive, rather than procedural way (e.g., going by gut instinct)?
    d. What artifacts do the students turn in?
    e. What criteria do you use to evaluate these artifacts?
    f. What records do you keep?
    g. What criteria do you use to evaluate these records?
4. Steve's correlations—Do the following aspects figure into your grading? Into your informal assessment?
    a. How well students in a group work together
    b. How much students in a group learn from each other
    c. How much effort the students put in?
    d. Attitudes towards science (static/dynamic)

B. Describe to me one of the worst projects you've seen so far.
1. What makes it a bad project?
    a. What features are missing?
    b. What features are done poorly? How do you characterize "poorly"?
2. What aspects of it are O.K.?
3. How could it be improved?

II. Communicating to students what makes a good project

A. Beginning of the year
1. How did you first communicate what a project was to your students?
2. What requirements and structures did you put into place for project work?

B. Now
1. How have you changed the way you communicate what a project is to your students?
2. What are your current requirements and structures for doing project work?

Interview Guide for Spring 1994 Interviews

Round Two Assessment Interview Questions/Plans

1. Review description of current classroom assessment infrastructure. Fill in holes. Bring print out of description with me and write on it together.

2. Bring copy of three good project papers from students at other school. Ask teacher to "grade" each of these papers and write me up an explanation of their grading decision—no more than one page long for each. Just a set of bullet points would be O.K. Give a deadline of May 9.

3. Create new infrastructure description that describes "pre-CoVis" classroom. For Roger, make sure this was at least two years ago. If there is time, get Roger to create an additional description that would match his structure for last year. Also if there is time, perhaps map out the structure of each quarter this year for each teacher.

4. If matrix has already been started, go over this with teacher. In particular, try to pull out what the aims are for various assessment practices and also the "effectiveness" ratings.

Assessment Interview Guide: First Quarter 1994–95

I. Create assessment chart.
   A. Explain how chart works to new teachers (Lance and Melanie).
   B. Make chart for fall quarter 1994/95.

II. Discuss role of technology in assessment.
   A. Do you use technology to communicate with your students? If so . . .
      1. With what mediums?
         a. E-mail?
         b. News?
         c. The notebook?
         d. Filesharing/public access files?
         e. Other?
      2. What do you communicate to your students using technology?
         a. Grades status?
         b. Feedback on project/class progress?
         c. Tidbits, chat, hints?
         d. Assignments?
      3. How does the use of technology to communicate with your students change they way you interact with them during class time?
         a. Do you communicate more information?
         b. Different kinds of information?
         c. Can you/do you structure classroom activity differently because of the email communications?
         d. Probe for any off-loading effects.
   B. Do you require technology use in your class?
      1. Give assignments specifically designed around technology use?
      2. Give assignments that require technology use or are easier with technology use?
      3. Give credit or require in grading scheme demonstration of technology use?
      4. Test ability to use technology?
   C. For continuing teachers, are there changes in the role that technology plays in your assessment structure since last year.

III. Go over highlights from the quarter.
   A. Major activities/projects for quarter?
   B. Activity patterns used so far, map or curricu-sums?
   B. Big stumbling blocks or successes?
   C. Review of weekly class notes?

Assessment Interview Guide: Second Quarter 1994–95

General Questions

1. Review of Q1 assessment chart.
   - Is anything missing?
   - Is anything misrepresented?
   - Fill in the details (see teacher specifics).

2. Create Q2 assessment chart.

3. Review Q1 projects/activities.
   - Label major project/activity cycles.
   - Clear up confusions (see teacher specific section).

4. Talk about flow of activity for second quarter.
   - Parallel activity
   - Serial activity
   - Compare to curricu-sum graph: How does students doing more than one thing at once show up in curriculum summaries?

5. Talk about curriculum summaries
   - How does teacher choose between student versus student project?
   - How does teacher choose between activity and lab?
   - What categories does teacher have problem with?

6. Have teacher categorize project types for Q1 and Q2 according to NT scheme. Note places where scheme doesn't work.

7. Talk about technology and assessment practices:
   - Technology *is* assessed.
   - Technology required/encouraged as part of assignment
   - Technology used as a vehicle for assessment communications

8. What are the major themes the teacher is trying to impart to his/her students through out the year?

Teacher Specific Follow-ups from Q1: Roger Wolfe

1. Can I photocopy his journal?

2. Can I photocopy the mentor surveys?

3. Can I photocopy presentation evaluations? Both the students' and RW's?

4. Get grades from Q1 and Q2?

5. Get CoVis Tools assignments?

6. Fill in criteria for the following assessment bits:
   - CoVis tools
   - Quiz—is it only on astronomy?
     Can we figure out how each section was evaluated?
   - Eval. form for project presentations and write-ups?

Teacher Specific Questions: Carol Patterson

1. Can I get grades?

2. Can I get photocopies of grading sheets for LUMPs and Food additives project?

3. Handouts to students for LUMPs directions

4. Other useful directions or evaluation forms?

5. How's Janice doing?

6. Compare LUMP, to Food Additives, to Composters, to Water Quality projects:
   - What's the same? Structurally? Pedagogically?
   - What's different?
   - Feel better about some compared to others? Why?

7. Role of mentors?

8. Give her Q1 assessment chart—can she review at her own leisure and give me comments on?

9. How is resource sharing going now?

10. From Q1 interview: Why did CP feel impulse to evaluate the CNB more frequently?

11. From Q1 interview: CP said she had required use of technology in the toxicology/food stuff . . . how and why?

Teacher Specific Questions: Gary Magi

1. Can I get grades?

2. Can I get photocopies of evaluation forms with teacher/student ratings? ([I] want to compare them)

3. Can I get copies of peer evals of projects as well as GM's?

4. Give GM copy of Q1 assessment chart.

5. How are peer evals figured into project grade? Or are they?

6. When were technology at Lakeside projects finally completed?

7. Ask about tracking system? Impact on GM's class?

Assessment Interview Guide: Third Quarter 1994–95

General Questions

1. Create Q3 assessment chart.

2. Talk about flow of activity for third quarter.
   - Parallel activity
   - Serial activity
   - Compare to curricu-sum graph: How does students doing more than one thing at once show up in curriculum summaries?
   - Label major project/activity cycles.

3. Talk about technology and assessment practices:
   - Technology *is* assessed
   - Technology required/encouraged as part of assignment
   - Technology used as a vehicle for assessment communications

4. Informal vs. formal assessment
   - Revisit this idea from last year.
   - What kinds of feedback do they give during class, between class, that don't show up in grading scheme
   - What are things that he notices that don't show up in grading scheme?
   - Are there things that he wished did show up in the grading scheme?

4. What is science?
   - Ask what their definition of science is . . .
   - Which of these have an explicit place in their assessment infrastructure?

5. Grades from Q3?

6. Major handouts, etc.

7. Discuss dissertation plans if there is time . . .

For Gary Magi only:

8. Clean up from Q2 interview:
    - Handouts from Q2
    - Requirements/expectations for energy project
    - Assessment chart for Q2

Assessment Interview Guide: Fourth Quarter 1994–95

1. Talk about flow of activity for third quarter.
   - Go over curriculum summary chart and make notes.
   - Label major project/activity cycles.

2. Create Q4 assessment chart.

3. Informal vs. formal assessment
   - Revisit this idea from last year.
   - What kinds of feedback does he give during class, between classes, that don't show up in grading scheme?
   - What are things that he notices that don't show up in grading scheme?
   - Are there things that he wished did show up in the grading scheme?

5. Quality projects
   - Give me an example of a really good project from this year. What made it a good project?
   - In general how are the students projects this year compared to last year?

6. Teacher performance and classroom success
   - How successful do you think your classroom was this year?
   - Was it more successful than last year? Why or why not?
   - How do you feel about your performance as a teacher this year?

7. Role of projects in the classroom
   - What role did projects play in the classroom for you this year?
   - How is this the same or different than last year?
   - What do you think is an appropriate role for projects in your classroom?
   - What are the advantages and disadvantages to using projects?
   - What do you like better about the way you've incorporated projects into your classroom this year?
   - What do you like less about the way you've incorporated projects into your classroom?

8. Assessing projects
   - Do you think you've gotten better at assessing projects? Why or why not?
   - What is important to think about when assessing projects?
   - If you had to give advice to a new green project based teacher about assessing projects, what advice would you give?

9. Talk about technology and assessment practices:
    - Technology *is* assessed.
    - Technology required/encouraged as part of assignment
    - Technology used as a vehicle for assessment communications

10. Get copies of major handouts.
    - Copy of student presentation evaluations (student and teacher?)
    - If he's been writing in journal copy it.
    - Get grades.
    - Copies of handouts and forms.

Instructional Goals Interview

Teacher Interview: Instructional Goals

A. Learning Goals:

Which of the types of learning goals listed below are most important in your classroom?

(Ask [a] first, then [c], then [b]. Ask "why" they make the 1–10 decisions they do.)

1. Understand specific scientific concepts
   a.) How key are goals of this type to your course?

irrelevant or inconsequential									extremely important
1	2	3	4	5	6	7	8	9	10

   b.) Are projects a good way to help you meet this goal?

projects are an extremely ineffective way of meeting this goal									projects are an extremely effective way of meeting this goal
1	2	3	4	5	6	7	8	9	10

   c.) What are some key learning goals you have for your students that would fit into this category? (Are these merely examples, or are they a pretty exhaustive list of your most important goals?)

[Note: The same set of three questions as above were asked for the next nine types of goals. Only the goals are listed here.]

2. Perform specific scientific skills
3. Understand what scientists do
4. Do what scientists do
5. Understand the applications of scientific findings
6. Understand the social, political and economic implications of scientific findings
7. Apply scientific findings
8. Develop work habits
9. Improve interpersonal skills
10. Increase personal motivation and growth

B. Goal section follow-up questions

1. Classroom climate goals.
   a.) What goals do you have as far as creating a classroom climate or environment is concerned? For example: type of student-teacher relationship, level of student choice and freedom, etc.

   b.) How key are goals of this type to your course?

irrelevant or inconsequential									extremely important
1	2	3	4	5	6	7	8	9	10

   c.) Are projects a good way to help you meet this goal?

projects are an extremely ineffective way of meeting this goal									projects are an extremely effective way of meeting this goal
1	2	3	4	5	6	7	8	9	10

2. Are there any changes you would make to the list of goal types above? E.g., a type I'm missing or some that ought to be collapsed?

3. Please rank each of the goal types listed above.
   _____ Understand specific scientific concepts
   _____ Perform specific scientific skills
   _____ Understand what scientists do
   _____ Do what scientists do
   _____ Understand applications of scientific findings
   _____ Understand social, political & economic impact of scientific findings
   _____ Apply scientific findings
   _____ Improve interpersonal skills
   _____ Develop work habits
   _____ Increase personal motivation and growth
   _____ Classroom climate goals

Assessment Interview Guide: First Quarter 1995–96

I. Create assessment chart for Q1.

II. Discuss informal assessment strategies
   A. Questioning in class and student responses to questions in class
   B. Circulating in class and giving feedback
   C. Students coming up to you for feedback
   D. Behind desk versus moving
   E. Keeping students on task
   F. Dealing with unwanted or troublesome behavior
   G. Figuring out whether or not kids are following you, if pace of class is working, etc.

III. Go over highlights from the quarter.
   A. Major activities/projects/units for quarter and their time tables
   B. Activity patterns used so far
   C. Big stumbling blocks or successes
   D. Discuss any major changes from the way this quarter was run last year.

   Fill in blank calendars for each month of Q1. Use this in lieu of curriculum summaries for Q1.

IV. Discuss students to follow.
   A. Pick three students.
   B. Discuss time lines for interviewing them.

V. Discuss collection strategies for:
   A. Grades
   B. Tests
   C. ALL handouts
   D. ALL evaluation forms
   E. Corrected work of students I'm following
   F. Curriculum summaries

VI. Discuss classroom observations.
   A. Introduce me to kids?
   B. Continue to come once a week until end of Q2.
   C. Plan to do more concentrated study of a project cycle sometime during Q3/Q4 (maybe end of Q2 depending on when cycles start and end).

D. How does it feel having me there?
   - Right now I'm pretty removed. What if I move around more? Talk to kids?
   - Problem of hearing what say to students in small conferences . . .
     - Better to follow you and listen from short distance, or
     - Use radio mike?

VII. Discuss role of technology in assessment.
   A. Do you use technology to communicate with your students? If so . . .
      1. With what mediums?
      2. What do you communicate to your students using technology?
         a. Grades status?
         b. Feedback on project/class progress?
         c. Tidbits, chat, hints?
         d. Assignments?
      3. How does the use of technology to communicate with your students change they way you interact with them during class time?
         a. Do you communicate *more* information?
         b. Different kinds of information?
         c. Can you/do you structure classroom activity differently because of the email communications?
         d. Probe for any off-loading effects.
   B. Do you require technology use in your class?
      1. Give assignments specifically designed around technology use?
      2. Give assignments that require technology use or are easier with technology use?
      3. Give credit or require in grading scheme demonstration of technology use?
      4. Test ability to use technology?
   C. For continuing teachers, are there changes in the role that technology plays in your assessment structure since last year?

Assessment Interview Guide: Second Quarter 1995–96

I. Create assessment chart for Q2
   A. Go over what was graded and how
   B. Collect grades for quarter
   C. Discuss satisfaction with assessment practices

II. Go over curriculum summaries and highlights from the quarter
   A. Major activities/projects/units for quarter and their time tables
   B. Activity patterns used so far
   C. Big stumbling blocks or successes.

III. Review tracking system of the school
   A. How does the tracking system work
   B. What do you think about the tracking system?
   C. How does the tracking system impact upon your grading practices?

IV. Impact of large scale assessment infrastructure
   A. What aspects of larger assessment infrastructures impact on how your run your class?
      - Department level
      - School level
      - District level
      - State level
      - National level
   B. What accommodations do you make in your class to deal with the larger assessment infrastructure?
   C. Are there things you would do differently if the larger assessment infrastructure did not put certain constraints upon you?

V. Reputation of the course
   A. What reputation do you think this course has amongst students? Why do you think that?
   B. What does the course "count" for within the school requirements system?
   C. What reputation do you think this course has amongst other teachers? Why do you think that?

Assessment Interview Guide: Third Quarter 1995–96

Roger Wolfe and Carol Patterson's Version

I. Create assessment chart for Q3.
   A. Go over what was graded and how.
   B. Collect grades for quarter.
   C. Discuss satisfaction with assessment practices.

II. Go over curriculum summaries and highlights from the quarter.
   A. Major activities/projects/units for quarter and their time tables
   B. Activity patterns used so far
   C. Big stumbling blocks or successes

III. Informal assessment patterns
   A. How and when do you give informal feedback to your students? Has this changed as a result of doing projects in your classroom? If so, how?
   B. Given patterns that I've noticed through observations, ask about teachers reasoning behind them.

IV. Review project cycle.
   A. What are your impressions of the performance of the focus students?
   B. What are your impressions of the performance of the class as a whole?

V. Role of technology and assessment
   A. Do you use technology to communicate with your students? If so . . .
      1. With what mediums?
      2. What do you communicate to your students using technology?
      3. How does the use of technology to communicate with your students change they way you interact with them during class time?
   B. Do you require technology use in your class?
      1. Give assignments specifically designed around technology use?
      2. Give assignments that require technology use or are easier with technology use?
      3. Give credit or require in grading scheme demonstration of technology use?
      4. Test ability to use technology?
   C. Are their changes in the role that technology plays in your assessment structure since last year?

Gary Magi's Version

I. Review tracking system of the school
   A. How does the tracking system work?
   B. What do you think about the tracking system?
   C. How does the tracking system impact upon your grading and teaching practices?

II. Impact of large scale assessment infrastructure
   A. What aspects of larger assessment infrastructures impact on how your run your class?
      - Department level
      - School level
      - District level
      - State level
      - National level
   B. What accommodations do you make in your class to deal with the larger assessment infrastructure?
   C. Are there things you would do differently if the larger assessment infrastructure did not put certain constraints upon you?

III. Create assessment chart for Q3.
   A. Go over what was graded and how.
   B. Collect grades for quarter.
   C. Discuss satisfaction with assessment practices.

IV. Review project cycle.
   A. What are your impressions of the performance of the focus students?
   B. What are your impressions of the performance of the class as a whole?

V. Reputation of the course
   A. What reputation do you think this course has amongst students? Why do you think that?
   B. What does the course "count" for within the school requirements system?
   C. What reputation do you think this course has amongst other teachers? Why do you think that?

VI. Informal assessment patterns
   A. How and when do you give informal feedback to your students? Has this changed as a result of doing projects in your classroom? If so, how?
   B. Given patterns that I've noticed through observations, ask about teacher's reasoning behind them.

Assessment Interview Guide: Fourth Quarter 1995–96

1. Discuss the disciplinary system at the school.
   - Tardies
   - Excused/unexcused absences
   - Suspension
   - Expulsion
   - Low grades
   - Attitude/behavior problems and breaking school rules

2. Discuss reward system at school.
   - Honor roll
   - End of year awards
   - Other institutionalized honors and “pats”

3. Create assessment chart for Q4.
   - Go over what was graded and how.
   - Collect grades for quarter.
   - Discuss satisfaction with assessment practices.

4. Go over curriculum summaries and highlights from the quarter.
   - Major activities/projects/units for quarter and their time tables
   - Activity patterns used so far
   - Big stumbling blocks or successes

5. Review project cycle.
   - What are your impressions of the performance of the focus students?
   - What are your impressions of the performance of the class as a whole?

6. Informal assessment patterns
   - How and when do you give informal feedback to your students? Has this changed as a result of doing projects in your classroom? If so, how?
   - Given patterns that I’ve noticed through observations, ask about teacher’s reasoning behind them.

7. Teacher performance and classroom success
   - How successful do you think your classroom was this year?
   - Was it more successful than last year? Why or why not?
   - How do you feel about your performance as a teacher this year?

8. Role of projects in the classroom
   - What role did projects play in the classroom for you this year?
   - How is this the same or different than last year?
   - What do you think is an appropriate role for projects in your classroom?
   - What are the advantages and disadvantages to using projects?
   - What do you like better about the way you've incorporated projects into your classroom this year?
   - What do you like less about the way you've incorporated projects into your classroom?

9. Assessing projects
   - Do you think you've gotten better at assessing projects? Why or why not?
   - Are you satisfied with the way you assess projects? Why or why not?
   - What is important to think about when assessing projects?
   - If you had to give advice to a new green project based teacher about assessing projects, what advice would you give?

10. Talk about technology and assessment practices:
    - Technology is assessed
    - Technology required/encouraged as part of assignment
    - Technology used as a vehicle for assessment communications

11. Changes for next year
    - Do you see yourself making any major changes to the way you run this course for next year? If so what are they and why will you be making them?
    - Do you see yourself making any changes to the way you do assessment in the course? If so, what are they and why will you be making them?

APPENDIX B: STUDENT INTERVIEW GUIDES FOR 1995–96

Student Assessment Interview Guide: Winter 1996 (initial design)

I. Purpose of this class
   1. In general, what is the purpose of this class?
   2. What are the things that it is most important to <teacher's name> that you should learn about or learn how to do in this class? (i.e. What do you think your teacher's goals are? What do you think your teacher believes the purpose of this class is?)
   3. Do you know why these things are important to him/her? (list what the student responded with in question #2) If so, can you tell me those reasons?

II. How to get an "A"
   1. What do you have to do to get an "A" in this class?

III. How assessment is done in this class
   (Read through all the questions first and then ask them one by one.)
   1. How are the quarter or semester grades calculated?
      Follow-ups:
      - What kinds of assignments do you turn in?
      - How much are they generally worth?
      - What kinds of behavior does s/he grade?
   2. How does turning in work, making up work, making deadlines, getting extra credit work?
   3. When and how do you get feed back on your work?
   4. When and how can you talk to your teacher about grades? (If you do . . .)

Student Assessment Interview Guide: Winter 1996 (revised)

After the first couple of students were interviewed, the guide changed slightly. This is its final version:

I. Purpose of this class
   1. In general, what is the purpose of this class?
   2. What are the things that it is most important to <teacher's name> that you should learn about or learn how to do in this class (i.e., what do you think your teacher's goals are? What do you think your teacher believes the purpose of this class is?)?
   3. How do you know this is what your teacher believes is important? What's your evidence?
   4. Do you know why these things are important to him/her? (List what the student responded with in question #2.) If so, can you tell me those reasons?

II. How to get an "A"
   1. What do you have to do to get an "A" in this class?
   2. Pretend I'm a new student to the class. What advice would you give me if I wanted to do well?
   3. Why did you take this class?

III. How assessment is done in this class
   (Read through all the questions first and then ask them one by one.)
   1. How are the quarter or semester grades calculated?
      Follow-ups:
      - What kinds of assignments do you turn in?
      - How much are they generally worth?
      - What kinds of behavior does s/he grade?
   2. How does turning in work, making up work, making deadlines, getting extra credit work?
   3. When and how do you get feed back on your work?
      - Oral feedback one-on-one
      - Oral feedback to whole class
      - Written feedback
   4. When and how can you talk to your teacher about grades? (If you do . . .)

Student Assessment Interview Guide: Spring 1995–96[2]

Name: _____

Date: _____

Start time: _____ End time: _____ Total time: _____

Counter: _____

I. Purpose and reputation of this class

❒ 1. In general, what is the purpose of this class?

❒ 2. What reputation does this class have?

❒ 3. Why do students, in general, take this class?

❒ 4. Why did *you* take this class?

II. Your Teacher's Goals

❒ 1. What are the things that it is most important to your teacher that you should **learn about** or **learn how to do** in this class?

- What do you think your teacher's goals are?
- What do you think your teacher believes the purpose of this class is?
- Do you agree with your teacher that these things are important?

❒ 2. How do you know these things are important to your teacher? What is your evidence?

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[2] Originally, this interview guide was a form which included space for taking notes on the students' responses. In the interests of brevity, this space has been removed.

❒ 3. Do you know why these things are important to him/her? If so, can you tell me those reasons?

- list what the student responded with in question #2.

III. How assessment is done in this class

Calculations—deadlines—absences/tardies—extra credit—feedback—communication about grades

❒ 1. How are the quarter or semester grades calculated?

- What kinds of assignments do you turn in?
- How much are they generally worth?
- What kinds of behavior does s/he grade? How much is it worth?
- What evaluation criteria is used? What constitutes a good lab, paper, etc.

❒ 2. What is the purpose of each of the things your teacher asks you to turn in or grades you on? Why does s/he ask you to do them?

❒ 3. How do deadlines and making up missed work in this class?

- Include how "missing" class and tardies are treated in general, as well as their relations to making up work.

❒ 4. Does your teacher offer extra credit?

- If so, for what kinds of work or activity? How much is it worth and how does it get figured into your grade?

❒ 5. What kind of feedback do you get on your work? How good or useful is the feedback?

- oral one-on-one or one on small group
- oral to whole class
- written feedback

❒ 6. When and how can you talk to your teacher about grades? (if you do . . .)

- How often do you get information about grades? What format?
- Special conferences on grades?
- Are grades public or private in this classroom (e.g., class ranges or individual scores are announced or posted)?
- Does the whole class ever argue about grades?

IV. How to get an "A"

❒ 1. How well do you understand how to be a good student in this class?

❒ 2. Pretend I'm thinking about taking this class next year. What advice would you give me?

- If I've decided for certain that I want to take the class and you're giving me advice on how to do well in it next year, what would you tell me?
- Probe student with the advice s/he would give with respect to each of the pieces of how the grade was calculated listed above. What is "A" work like?
- Is there anything which took you a while to figure out when you were first new to this class?

V. Opinions on the assessment practices in this class

❒ 1. Do you feel the grading and feedback in this class is done fairly?

❒ 2. What are your opinions on the way grading and feedback is done in this class? What do you like and what do you dislike?

❒ 3. If you could change anything about the way grading and feedback are done in this class, would you?

- If so, what would you change?

VI. Comparing this class to others

❒ 1. Did this class turn out be what it at you expected it to be like?

- If not how is it different from what you expected?
- Is it either easier or harder than you expected it to be? _____ If so, in what ways?

❒ 2. Is this class different that other science classes here at your school? If so, how is it different?

❒ 3. Have you done projects in any of your other science classes?

- If so, how are they similar or different to the ones you've done in this class?

❒ 4. In what ways is the grading done in this class similar or different to the grading done in other science classes you have taken?

Student Project Interview Guide: Third Quarter Project 1995–96[3]

Name: _____

Date: _____

Start time: _____ End time: _____ Total time: _____

Tape: _____

I. Describe the project itself

❒ 1. Did you understand what you were supposed to do for this project?

- What were you supposed to do for this project?

❒ 2. What was *your* project about?

❒ 3. What did you *do* to complete your project? What kinds of work did you do to complete it?

❒ 4. Did you ever feel you weren't sure what your teacher wanted you to do?

- If so, when and why were you unsure?

❒ 5. What things did you hand into your teacher for him/her to grade?

❒ 6. How much time did you spend working on each of these things?

---

[3] Originally, this interview guide was a form which included space for taking notes on the students' responses. In the interests of brevity, this space has been removed.

II. Quality of the project

❒ 7. What did your teacher think about your project and did you agree with him/her?

- How good did your teacher think your project was?
- Did you agree or disagree with him/her? What did you think of your project?
- What did your teacher think were the strengths & weaknesses of your project?
- Did you agree with him/her? What did *you* think the strengths and weaknesses or your project were?

❒ 8. How do you know what your teacher thought of your project?

❒ 9. What would you do differently if you had to do your project all over again knowing what you know now?

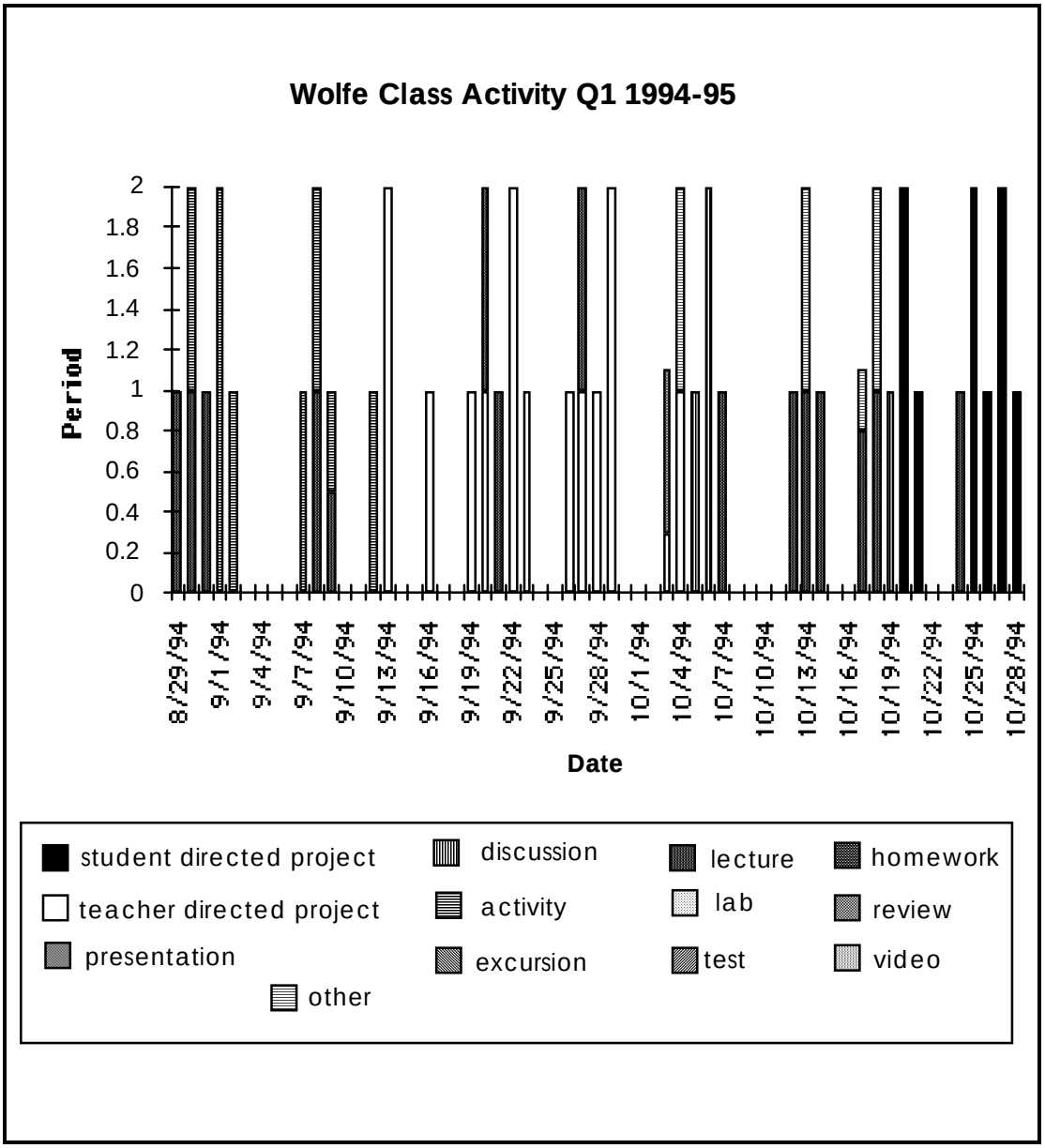
❒ 10. What was your biggest stumbling block while you were working on the project?

❒ 11. What do you think of the way your teacher grades projects in general?

❒ 12. What do you think of the way your teacher graded this project specifically?

❒ 13. What do you think of projects as a way of learning science?

APPENDIX C: SAMPLE CURRICULUM SUMMARY CHART FROM 1994–95



APPENDIX D: STUDENT SURVEYS

CoVis Fall Survey—Selected items

Only a subset of the items asked in the CoVis Fall Survey were reviewed and analyzed for this study. Included here are the overall instructions for the survey as well as those items used in this study.

Technology Background and Attitudes

The questions in this section are designed to help us understand your knowledge of computers and other technologies and how you may have used them in the past.

7. How much experience do you have using computers in each of the following ways:

Using computers for . . .	**I have never done this**		**I am *fairly* experienced at this**		**I am *very* experienced at this**
a. word processing	1	2	3	4	5
b. data analysis (spreadsheets)	1	2	3	4	5
c. electronic mail	1	2	3	4	5
d. playing games	1	2	3	4	5
e. getting on-line information	1	2	3	4	5
f. downloading software or other files from the Internet	1	2	3	4	5
g. using on-line chat or discussion groups	1	2	3	4	5
h. playing MUDs or MOOs	1	2	3	4	5

Science Beliefs and Attitudes

The questions in this section of the survey help us to understand your beliefs and feelings about science and science related topics.

9. The three questions in the box below ask you about your future plans about science. Please answer each question by circling a number.

Can you see yourself . . .	***definitely yes***		***maybe***		***definitely no***
a. becoming a scientist?	1	2	3	4	5
b. majoring in science in college?	1	2	3	4	5
c. using science in your career?	1	2	3	4	5

11. How comfortable would you feel asking a scientist outside your school for help on a science project? (Circle the number on the 1 to 10 scale below that best represents your attitude.)

I would *not feel comfortable* at all	0 1 2 3 4 5 6 7 8 9 10	I would feel *very comfortable*

12. How much do you think what you learn in science class will affect what you do in everyday life outside of your classes? (Circle the number on the 1 to 10 scale below that best represents your belief. Use a “0” if you think it has *no* affect and a “10” if you believe it would have a *large* affect.)

No affect at all	0 1 2 3 4 5 6 7 8 9 10	A *large* affect

Attitudes towards school

15. For each of the following subject areas, please circle a number to indicate the degree to which you agree or disagree with the statement. If you have not taken a particular course, please check "does not apply."

Circle a number or check a box for each statement below:	***disagree strongly***		***neutral***		***agree strongly***	**Does Not Apply**
g. I enjoy classes in science.	1	2	3	4	5	❑
h. I do very well in my science classes.	1	2	3	4	5	❑

16. Please circle one number for each of the following three scales:

a.

I am NOT a "science" or "math" person		**Neutral**		**I AM a "science" or "math" person**
1	2	3	4	5

17. Which of the following best describes your average grades so far in school? (please check only one)

❑ a. Mostly A

❑ b. About half A and half B

❑ c. Mostly B

❑ d. About half B and half C

❑ e. Mostly C

❑ f. About half C and half D

❑ g. Mostly D

❑ h. Mostly below D

Background

These questions are designed to help us learn more about who you are.

19. How far in school did your mother (or female guardian) go? (please check one)

- ❑ a. She did not finish high school.
- ❑ b. She graduated from high school.
- ❑ c. She had some education after high school.
- ❑ d. She graduated from college.
- ❑ e. She has a graduate degree (i.e., Master's or Ph.D.).
- ❑ f. I don't know.

20. How far in school did your father (or male guardian) go? (Please check one.)

- ❑ a. He did not finish high school.
- ❑ b. He graduated from high school.
- ❑ c. He had some education after high school.
- ❑ d. He graduated from college.
- ❑ e. He has a graduate degree (i.e. Master's or Ph.D.).
- ❑ f. I don't know.

21. What is the one thing that is likely to take the largest share of your time in the year after you graduate/leave high school? (Please check only one.)

- ❑ a. Working full time
- ❑ b. Attending a two-year college or a vocational, technical, or business school
- ❑ c. Attending a four-year college, service academy, or university
- ❑ d. Other (what?)_____

22. How many hours per week do you usually work in a part-time job? (Exclude vacations. If you do not have a job, write a "0".) _____ hours

23. How many hours do you usually spend on homework each day? _____ hours

24. Which best describes you? (check *all* that apply)

- ❑ a. White
- ❑ b. Black
- ❑ c. Hispanic
- ❑ d. Asian Indian or Middle Eastern
- ❑ e. Asian or Pacific Islander
- ❑ f. Native American or Alaskan Native
- ❑ g. Other (what?)_____

25. What is your current grade in school? (please check one)

- ❑ a. 6th Grade
- ❑ b. 7th Grade
- ❑ c. 8th Grade

- ☐ d. 9th Grade
- ☐ e. 10th Grade
- ☐ f. 11th Grade
- ☐ g. 12th Grade

26. What is your age? _____

27. Are you female or male? (please check one)

- ☐ a. Female
- ☐ b. Male

CoVis Spring Survey

The instructions for the spring version of the CoVis Survey were the same as in the fall, so they are not presented a second time. The questions about beliefs and attitudes towards science and school, as well as technology background and attitudes were all asked in the spring with the same wording as in the fall and so are not repeated here. The items listed are those which only appeared in the spring survey and were reviewed for this study.

Attitudes towards this class

1. How well do you think you understand how to be a good student in this class? (Circle the number on the 0 to 10 scale below that best represents your attitude.)

not at all	0	1	2	3	4	5	6	7	8	9	10	***very* well**

2. How good do you think your teacher is at letting you know what s/he expects you to do? (Circle the number on the 0 to 10 scale below that best represents your attitude.)

***very* bad**	0	1	2	3	4	5	6	7	8	9	10	***very* good**

3. How well do you think your teacher knows what you know and can do? (Circle the number on the 0 to 10 scale below that best represents your attitude.)

not at all	0	1	2	3	4	5	6	7	8	9	10	***very* well**

4. How challenging is this class?
   (Circle the number on the 0 to 10 scale below that best represents your attitude.)

not at all	0	1	2	3	4	5	6	7	8	9	10	***very* challenging**

5. How much do you think you are learning in this class?
   (Circle the number on the 0 to 10 scale below that best represents your attitude.)

nothing	0	1	2	3	4	5	6	7	8	9	10	**much more than in most classes**

6. Do you enjoy this class?
   (Circle the number on the 0 to 10 scale below that best represents your attitude.)

not at all	0	1	2	3	4	5	6	7	8	9	10	**much more than most classes**

	they're worthless										**they're great**	**never did projects**
7. Do you think projects are a good way of learning science?	0	1	2	3	4	5	6	7	8	9	10	NP

(Circle the number on the 0 to 10 scale that best represents your attitude.)

8. How many high school science classes, including those you are enrolled in this year, have you taken? _____ classes

	***completely* different**	**never taken other science**
9. How different is this science class from other science classes you've taken?	0 1 2 3 4 5 6 7 8 9 10	NT
10. How different is the way grading is done in this classroom from other science classes you've taken?	0 1 2 3 4 5 6 7 8 9 10	NT

(Circle the number on the 0 to 10 scale that best represents your attitude.)

11. Have you done science projects in any of your other science classes?

- ❑ Yes
- ❑ No
- ❑ Never taken another science class

	***completely* different**	**never did projects**
12. If you did science projects in another science class, how similar were they to the projects you do in this class?	0 1 2 3 4 5 6 7 8 9 10	NP

(Circle the number on the 0 to 10 scale that best represents your attitude.)

Student Beliefs about Class Goals: Spring 1996

A. The importance of various types of instructional goals

Listed below are 15 different types of instructional goals that your teacher might have for this science course. For each of these types of goals, you are asked how important you think goals of this type are to your teacher and how important you think goals of this type are to you. Circle a number from one to ten that best indicates how important you think goals of this type are, where a **one** means that such goals are irrelevant or inconsequential and a **ten** means that such goals are extremely important.

1. Understand specific scientific concepts . . .
such as the chemical mechanism for ozone depletion in the stratosphere or the theory and mechanisms of plate tectonics.

	irrelevant or inconsequential									extremely important
a. How important is it to your ***teacher*** that you learn specific scientific concepts in this course?	1	2	3	4	5	6	7	8	9	10
b. How important is it to ***you*** that you learn specific scientific concepts in this course?	1	2	3	4	5	6	7	8	9	10

2. Perform specific scientific skills . . .
such as data measurement and collection (for example, collecting soil samples or water samples or measuring air temperature or water quality) or data analysis (for example, reading and creating maps, graphs and charts, or doing statistics).

3. Perform specific technological skills . . .
such as looking for appropriate data and information on the internet using a web browser like Netscape, creating graphs using a spreadsheet program like Excel, shooting and editing video, creating a presentation with a program like PowerPoint, or learning to do desktop publishing.

4. Understand what social scientists do . . .
such as the type work done in the fields of anthropology, psychology, and sociology.

5. **Understand what natural scientists do . . .**
   such as the type of work done in the fields of geology, environmental science, oceanography and ecology.

6. ***Do* what social scientists do . . .**
   such as the type of work done by anthropologists, psychologists or sociologists.

7. ***Do* what natural scientists do . . .**
   such as the type of work done by chemists, geologists, biologists, physicists or ecologists.

8. ***Understand* how previous scientific findings are applied to, inform, and contrast with new scientific findings . . .**
   such as understanding how and why human beings have changed their ideas of the relationship of the earth to other planetary bodies (e.g. sun and moon) over time.

9. ***Understand* the how previous scientific findings can be applied to practical problems . . .**
   such as creating a land use management plan for your town, designing an energy efficient office building or building an earthquake resistant house.

10. **Understand the social, political and economic implications of scientific findings . . .**
    such as the economic effects of controlling (or not controlling) pollution emissions in various countries around the world in response to worries about air pollution and/or global warming.

11. ***Apply* previous scientific findings to new scientific investigations . . .**
    such as taking what is already known about soil and soil nutrients and applying it to an experiment to determine what fertilizer, soil supplements or other horticultural care would best enable you to grow plants not native to your hometown on your school grounds.

12. ***Apply* previous scientific findings to practical problems . . .**
    such as designing a city by the ocean to minimize effects from hurricanes or building an energy efficient engine, finding a new source of iron to mine, or proposing a set of measures for controlling pollution levels in a large city.

13. **Develop work habits . . .**
    such as staying on task, managing your time well, planning out work well and paying attention to the details as it is accomplished.

14. Improve interpersonal skills . . .
such as dividing or sharing effort when doing work in groups, resolving tensions and conflicts when working in groups, or communicating with people outside the classroom in the course of your work (e.g., mentors, experts, people you interview, etc.)

15. Increase personal motivation and growth . . .
such as demonstrating initiative, finding things of interest in what is being studied, demonstrating leadership potential, making an attempt to improve your performance in weak areas related to the class.

16. Are there any other learning or teaching goals for this class that you think are important to your ***teacher*** or which are important to ***you*** which were not listed above? If so, what are they and on a scale of 1 to 10, where "1" means it is irrelevant or inconsequential and "10" means it is extremely important, how important are they to both you and your teacher?

Teaching or learning goal	**How important to your *teacher?***	**How important to *you?***
_____	☐	☐
_____	☐	☐
_____	☐	☐
_____	☐	☐

B. Ranking types of learning

Please rank each type of learning listed below on how important it is to you and how important it is to your teacher. Start by picking your teacher's number one concern from the list below and putting a "1" in the box next to it and under the column labeled "Your teacher's rankings" to indicate that this is the type of learning that is most important to your teacher. Then read through the list again and pick the type of learning that is second most important to your teacher and put a "2" in the box next to it and so on until all 15 goal types are ranked, so that a "1" means it is the most important type of learning to your teacher and a "15" means its the least important type of learning to your teacher. Then do the same for *your* rankings in the second column. (If you listed other goals in questions 16 above, please add them to the list at the bottom first and rank them with the others. If you added one goal, then your rankings will be from 1 to 16; if you added two goals your rankings will be from 1 to 17, etc.)

	Type of learning	**Your teacher's rankings**	**Your rankings**
1.	Understand specific scientific concepts		
2.	Perform specific scientific skills		
3.	Perform specific technological skills		
4.	*Understand* what social scientists do		
5.	*Understand* what natural scientists do		
6.	*Do* what social scientists do		
7.	*Do* what natural scientists do		
8.	*Understand* how previous scientific findings are applied to, inform or contrast with new scientific investigations.		
9.	*Understand* how previous scientific findings can be applied to practical problems.		

	Type of learning	Your teacher's rankings	Your rankings
10.	Understand the social, political and economic implications of scientific findings		
11.	*Apply* previous scientific findings to new scientific investigations		
12.	*Apply* previous scientific findings to practical problems.		
13.	Develop work habits		
14.	Improve interpersonal skills		
15.	Increase personal motivation and growth		
16.	_____		
17.	_____		
18.	_____		
19.	_____		

C. Your opinions about this class

1. Why did you take this class?

2. How hard did you think this class would be when you originally signed up?
(Circle the number from 1 to 10 that best represents what you think.)

really easy									*really* hard
1	2	3	4	5	6	7	8	9	10

3. Is it harder or easier than you had expected it to be?
(Circle the number from 1 to 10 that best represents what you think.)

much easier				about what I expected					*much* harder
1	2	3	4	5	6	7	8	9	10

4. How different was this class from what you expected?
(Circle the number from 1 to 10 that best represents what you think.)

exactly as I expected									*very* different from what I expected
1	2	3	4	5	6	7	8	9	10

5. In what ways is this class different from what you expected?

6. What science classes have you taken during high school so far, including those you are enrolled in this year?

7. How fair do you think your teacher's grading practices are?

extremely *un*fair									extremely *fair*
1	2	3	4	5	6	7	8	9	10

8. Are grading and feedback in this class done differently than in other science classes you've taken? If so, in what ways is it different?

9. If you could change the way grading is done in this class, is there anything you would change about it? If so, what would you change?

APPENDIX E: TEACHER SURVEY

General instructions

If you are short on time, go through and answer the questions where you can circle responses or rank things and leave the short answer sections until last. Questions about "your class" or "this class" refer to classes which you think of as "CoVis classes"—those which are linked in your mind with the pedagogical strategies and tools promoted by CoVis.

A. The importance of various types of instructional goals

1. Understand specific scientific concepts

	irrelevant or inconsequential									extremely important
a. How important is it to ***you*** that your students learn specific scientific concepts in this course?	1	2	3	4	5	6	7	8	9	10
b. How important is it to ***your students*** that they learn specific scientific concepts in this course?	1	2	3	4	5	6	7	8	9	10

c. Give a couple of **examples** of specific scientific concepts that you want your students to learn in this course:

	Projects are very *in*effective at meeting this goal									Projects are very *effective* at meeting this goal
d. Are **projects** a good way of getting your students to understand specific scientific concepts?	1	2	3	4	5	6	7	8	9	10

	very *un*satisfied									*very* satisfied
e. Are you satisfied with the way you **assess** whether your students understand specific scientific concepts?	1	2	3	4	5	6	7	8	9	10

f. **Which** of your **assessment methods**, strategies and structures is applicable to evaluating whether or not students have learned specific scientific concepts?

[The same six questions in the same format were asked for fourteen other types of goals. In the interests of saving space, those types of goals are simply listed, rather than the complete set of questions as originally on the survey form.]

2. Perform specific scientific skills.

3. Perform specific technological skill.

4. Understand what social scientists do.

5. Understand what natural scientists do.

6. *Do* what social scientists do.

7. *Do* what natural scientists do.

8. *Understand* how previous scientific findings are applied to, inform, and contrast with new scientific findings.

9. *Understand* the how previous scientific findings can be applied to practical problems.

10. Understand the social, political and economic implications of scientific findings.

11. *Apply* previous scientific findings to new scientific investigations.

12. *Apply* previous scientific findings to practical problems.

13. Develop work habits.

14. Improve interpersonal skills.

15. Increase personal motivation and growth.

16. Are there any **other learning or teaching goals** for this class that **you think are important to you or your students** which were not listed above? If so, what are they and on a scale of 1 to 10 how important are they to both you and your teacher?

Teaching or learning goal	**How important to *you*?**	**How important to *your* students?**
_____	☐	☐
_____	☐	☐
_____	☐	☐
_____	☐	☐

17. Give an example or two of each type of goal you listed above in question #16:

18. On a scale of 1-10, how good are **projects** at getting your students to achieve the teaching and learning goals you listed in question #16 and how satisfied are you with your **means of assessing** their progress?

Teaching or learning goal	**Projects' effectiveness**	**Assessment satisfaction**
_____	☐	☐
_____	☐	☐
_____	☐	☐
_____	☐	☐

19. **List** the **assessment methods**, strategies and structures is applicable to evaluating whether or not students have reached or are making progress on each of the teaching and learning goals you listed in question #16:

B. Ranking types of learning

Please rank each type of learning listed below as to how important it is to you and how important it is to your students. Use a 1 to indicate it is the *most* important type of learning listed. (If you listed other goals in questions 16 above, please add them to the list at the bottom first and then rank them all.)

	Type of learning	Your rankings	Your students' rankings
1.	Understand specific scientific concepts.		
2.	Perform specific scientific skills.		
3.	Perform specific technological skills.		
4.	*Understand* what social scientists do.		
5.	*Understand* what natural scientists do.		
6.	*Do* what social scientists do.		
7.	*Do* what natural scientists do.		
8.	*Understand* how previous scientific findings are applied to, inform or contrast with new scientific investigations.		
9.	*Understand* how previous scientific findings can be applied to practical problems.		
10.	Understand the social, political and economic implications of scientific findings.		
11.	*Apply* previous scientific findings to new scientific investigations.		
12.	*Apply* previous scientific findings to practical problems.		
13.	Develop work habits.		
14.	Improve interpersonal skills.		
15.	Increase personal motivation and growth.		

16. _____ ☐ ☐

17. _____ ☐ ☐

18. _____ ☐ ☐

19. _____ ☐ ☐

C. Miscellaneous

1. What do you think is (are) the main reason(s) most of the students in your CoVis class have taken it?

2. For the most part, do you think this class is harder or easier than they expected? (Circle the number from 1 to 10 that best represents what you think.)

much easier				about what they expected					*much* harder
1	2	3	4	5	6	7	8	9	10

3. For the most part, do you think this class was much different than students expected it to be?
(Circle the number from 1 to 10 that best represents what you think.)

exactly what they expected									*extremely* different
1	2	3	4	5	6	7	8	9	10

4. What things about your class do you think students didn't expect?

5. Are there any parts of your assessment practices and structures that students find unusual, confusing or troublesome? If so, what are they and what concerns/problems do students have with them?

APPENDIX F: GRADING SYSTEMS FOR 1995–96

Roger Wolfe's Grading System

First Semester

First semester = $\frac{\text{Q1 (100 points) + Q2 (100 points)}}{2}$

(where Q1=first quarter & Q2=second quarter)

First Quarter = $\frac{\text{WorkGradeFinal (100 points)}}{100} * 50 + \frac{\text{ContentTest (100 points)}}{100} * 50 +$

Computer Test (20 points)

WorkGradeFinal = WorkGrade (100 points) – DaysMissed $- \frac{\text{MinutesMissed}}{40} +$

TimeMadeUp

WorkGrade = $\frac{\text{TechnologyAssignments (10 points) + DailyWork (40 points)}}{50} * 100$

TechnologyAssignments = SendRogerEmail (5 points) + NewsWatcherSummary

(5 points)

$$\textbf{Second Quarter} = \frac{\text{Paper (100 points) + WorkGrade (100 points) - TimeAbsent}}{2}$$

$$\text{Work Grade} = \text{Roger'sWorkGrade (100 points)} + \frac{\text{Peer\&SelfWorkGrade (100 points)}}{4}$$

$$\text{Roger'sWorkGrade} = \frac{\text{MilestoneGrade (100 points) + DailyWorkGrade (100 points)}}{2}$$

$$\text{DailyWorkGrade} = \frac{\text{“+” days}}{\text{(“+” days) + (“-” days)}}$$

. . . where “+” days are time observed on task and “-” days are time observed not on task

“+” and “-” periods are sometimes recorded as fractions, i.e. $\frac{1}{3}$ “+” and $\frac{2}{3}$ “-”

$$\text{MilestoneGrade} = \frac{\sum \text{Milestones}}{55} * 100$$

Milestones...		Partner&Topic	(5 points)
	+	BackgroundInfoIn	(10 points)
	+	QualityofBackgroundInfo	(10 points)
	+	ProposalIn	(10 points)
	+	DataIn	(10 points)
	+	PaperIn	(10 points)
	=	Total	(55 points)

Second Semester

$$\textbf{Second Semester} = \frac{\text{Q3 (100 points) + Q4 (100 points)}}{2}$$

(where Q3 = third quarter and Q4=fourth quarter)

Q3 if you had already turned in paper #2:

$$\textbf{Q3} = \frac{\frac{\text{Proj\#1Presentation}}{100} * 20 + \frac{\text{WorkGrade}}{100} * 50 + \frac{\text{Paper \#2}}{100} * 50 + \frac{\text{ElectronicCopyPaper\#1}}{10}}{130} * 100$$

(where Proj#1Presentation, WorkGrade and Paper#2 were all worth 100 points and the ElectronicCopyPaper#1 was worth 10 points)

Q3 if you had *not* turned in paper #2:

$$\textbf{Q3} = \frac{\frac{\text{Proj\#1Presentation}}{100} * 20 + \frac{\text{WorkGrade}}{100} * 20 + \frac{\text{ElectronicCopyPaper\#1}}{10}}{80} * 100$$

Work grade calculation was the same in both cases:

$$\text{WorkGrade} = \frac{\text{MilestoneGrade + DailyWorkGrade}}{2}$$

$$\text{DailyWorkGrade} = \frac{\text{“+” days}}{\text{“+” days + “-” days}} * 100 - \text{DaysMissed} - \frac{\text{MinutesMissed}}{40} + \text{TimeMadeUp} + 10$$

$$\text{MilestoneGrade} = \frac{\sum \text{Milestones}}{35} * 100$$

Milestones . . .		Partner&Topic	(5 points)
	+	Background Info In	(10 points)
	+	Proposal In	(10 points)
	+	Paper In	(10 points)
	=	Total	(35 points)

What the fourth quarter grade was supposed to be (according to interview)

$$\textbf{Q4} = \frac{\frac{\text{Proj\#2Presentation}}{100} *25 + \frac{\text{WorkGrade}}{100} *50 + \frac{\text{Paper \#3}}{100} *25 + \frac{\text{Presentation\#3}}{100} *25}{125} *100$$

What it actually was (according to Roger's spreadsheet for observed section)

$$\textbf{Q4} = \frac{\frac{\text{Proj\#2Presentation}}{100} *25 + \frac{\text{WorkGrade}}{100} *50 + \frac{\text{Paper \#3}}{100} *25 + \frac{\frac{\text{Presentation\#3}}{100} *25}{}}{125}$$

$$\text{WorkGrade} = \frac{\text{MilestoneGrade} + \text{DailyWorkGrade} + \text{GroupWorkGrade}}{3}$$

$$\text{DailyWorkGrade} = \frac{\text{“+” days}}{\text{“+” days} + \text{“-” days}} * 100 - \text{DaysMissed} - \frac{\text{MinutesMissed}}{40} + \text{TimeMadeUp} + 10$$

$$\text{GroupWorkGrade} = \frac{\text{Self grade + each team members grade of you}}{\text{number of team members}} * 100$$

$$\text{MilestoneGrade} = \frac{\sum \text{Milestones}}{75} * 100$$

Milestones . . .		Electronic Copy Paper #2	(10 points)
	+	Paper #2 sent to mentor	(10 points)
	+	Partners & Topic	(5 points)
	+	Background Info In	(10 points)
	+	Question or Proposal In	(10 points)
	+	Paper #3 In	(10 points)
	+	Paper #3 sent to mentor	(10 points)
	=	Total	(75 points)

Weight Given to Various Kinds of Work Each Quarter

	Q1	Q2	Q3	Q4	Average
Work Grade	50%	50%	38.5%	50%	47%
Milestones		18.75%	19.25%	16.7%	16.2%
Daily Work Grade	40%	18.75%	19.25%	16.7%	23.7%
Peer/Self Work Grade	—	12.5%	—	16.7%	7.3%
Paper Grade	—	50%	38.5%	25%	28.4%
Presentation Grade	—	—	15%	25.2%	10.05%
Tests	50%	—	—		12.5%
Other	10%* Technology assignments		8% (E-Copy of Paper #1)		2%

Carol Patterson's Grading System

First Semester

Graded Item	Points	% Semester Grade
Homework—Total	65	6%
Assignments Q1 (3, 5 to 20 points each)	35	
Assignments Q2 (none)	0	
Reaction papers Q1 (1)	10	
Reaction papers Q2 (2, 10 points each)	20	
Labs—Total	170	17%
Q1 (5, 10-20 points each)	90	
Q2 (4, 10-30 points each)	80	
Projects—Total	660	61%
Q1: LUMP Progress reports (2, 10 points each)	20	
Q1: LUMP Final project	200	
Q2: Food Additives Progress reports (3, 10 pts each)	30	
Q2: Food Additives Project & Final exam	410	
Exams—Total	166	15%
Q1 (2 tests, 82 points and 84 points)	166	
Q2 (no tests)	0	
EnviroNews (semester obligation)	10	1%
Activities (2, 5 & 10 points each)	15	1%
Miscellaneous nice things (semester extra credit)	35	
Extra water quality tests	5	
Review extra articles	15	
Class Participation	15	
Total	1086	

Second Semester

Graded Item	Points	% Semester Grade
Reaction Papers—Total	40	5%
Q3 (2, 10 points each)	20	
Q4 (2, 10 points each)	20	
Labs—Total	140	16%
Q3 (3, 20 or 30 points each)	80	
Q4 (3, 20 points each)	60	
Activities	60	7%
Q3 (4, 10 points each)	40	
Q4 (2, 10 points each)	20	
Projects—Total	415	48%
Q3: Global Warming project	245	
Group Cohesiveness	25	
Individual	25	
Paper	130	
Presentation	65	
Q4: Independent Spring Project	170	
Proposal	15	
Product	100	
Presentation	30	
Individual	25	
Quizzes—Total	181	21%
Q3 (2 quizzes, 64 points & 70 points)	134	
Q4 (1 quiz)	47	
Class Participation (semester grade)	25	3%
Miscellaneous nice things (semester extra credit)	45	
Additional ozone outline	5	
Visualizer trouble-shooting	5	
Ozone review packet	10	
Statistical Workup	5	
Extra Water tests	10	
Hazardous and persistent waste review	10	
Total	861	

Gary Magi's Grading System

Instead of providing a summary of Gary's calculation and grading system, the evaluation forms he used for assigning and discussing grades are provided for the first, second and fourth quarters. (The third quarter evaluation form seems to have gone missing). These documents show the categories Gary was considering when making grades, even if they do not demonstrate which of those categories weighed more. The layout and formatting used here is similar, but not exactly the same as that used by Gary. The margins and font have been changed to meet dissertation document requirements, extra space which Gary used for comments has been removed, and annotations on how the form was used have been added.

Grades in the form of E, S, or U were recorded on each line by both the students and the teachers under the "evaluation column" for each graded item listed on the form. An overall grade was then put in the box next to "Grade for Individual work," the large box at the bottom of each of the major subsections, "Individual Work," "Personal Outcomes," "Project Milestones," and "Final Team Product." Gary or Karen then decided on a final grade for each section (sometimes in consultation with the student) and added a note next to the box which changed the students' grade to one on an A, B, C, D, F scale. They used pluses and minuses throughout the form. The final grade for the quarter overall was always on the A–F scale. This process changed somewhat by the fourth quarter when the used an A, B, C, D, F scale for the entire form.

STS First Quarter Evaluation

(E = Excellent, S= Satisfactory, U = Unsatisfactory)

INDIVIDUAL WORK

	Comments	— Evaluation — Student	Teacher
Journal Work		_____	_____
Formal Essays		_____	_____
Home Inventory		_____	_____
Portrait of Home Report		_____	_____
Evidence of Learning		_____	_____
Technical Requirements		_____	_____
Clarity of Writing		_____	_____

Grade for Individual work: ☐

PERSONAL OUTCOMES

	Comments	— Evaluation — Student	Teacher
Self-Directed Learning		_____	_____
Collaboration/Teamwork		_____	_____
Time Management/ Organization of Materials		_____	_____

Grade for Personal Outcomes: ☐

TEAM PROJECT WORK

(To be evaluated by *peers* and teacher)

Project Milestones

	Comments	— Evaluation — Team	Teacher
Project Outline		_____	_____
Storyboard Outline/Storyboards		_____	_____
Script		_____	_____
Research Notes		_____	_____
Bibliography / Source List		_____	_____
Timeliness in Meeting Deadlines		_____	_____

Grade for Project Milestones: ☐

Final Team Product

(To be evaluated by *peers* and teacher)

	Comments	— Evaluation — Peer	Teacher
Depth of Content		_____	_____
Technical Quality		_____	_____
Entertainment Value		_____	_____
Team Knowledge of the Subject		_____	_____

Grade for Final Product: ☐

EVALUATION SUMMARY

Student Comments:

Accomplishments:

Challenges:

Attendance/Tardiness:
Number of Unexcused Absences: _____ Number of Tardies: _____

Civic Contribution:
Honors credit? (Y/N) _____ Contract Completed? (Y/N): _____

Grade for 1st Quarter: _____ _____ _____
Student Teacher Negotiated

_____ _____ _____
Student signature Teacher Signatures

STS First Quarter Evaluation Criteria

EVIDENCE OF LEARNING	Satisfactory	Excellent
Journal Work	Wrote excellent entries for more than half of the possible journal entries.	Wrote excellent entries for more than two-thirds of the possible journal entries.
Formal Essays	Turned in a good first draft for both essays.	Turn in an excellent revision for both essays.
Home Inventory	Completed more than two-thirds of the required sections.	Completed all but one of the required sections in a thorough manner.
Portrait of Home Report:		
Evidence of Learning	Showed good evidence of learning about most technical systems.	Showed excellent evidence of learning about all technical systems.
Technical requirements	Completed two computer graphics. Spell checked, double spaced.	Completed all four required graphics. Double spaced, title page, spell checked.
Clarity of Writing	Good first draft. Clearly proof-read before submitted.	Excellent revision. good organization of topics, all grammar correct, articular description of subject.

PERSONAL OUTCOMES		
Self-Directed Learning	Used class time well. Worked consistently on activities and projects.	Took a leadership role in activities, projects and other class activities. Worked at home, during lunch and/or other free time.
Collaboration/Teamwork	Worked well with teammates. Was attentive and participated in lecture/discussions.	Helped organize and manage team efforts. Motivated others and helped them to learn.
Time Management / Organization	Met most individual and team deadlines. Kept work and materials in order.	Met almost all deadlines punctually. Helped organize own and other's work/materials.

PROJECT MILESTONES	Satisfactory	Excellent
Project Outline	Submitted outline of project with good level of detail in a timely manner.	Submitted outline with excellent scope and detail by deadline. Revised as necessary.
Storyboard Outline	Submitted storyboard outline and complete set of storyboards.	Submitted outline and storyboards and revised as necessary.
Script	Submitted complete script.	Submitted thorough and articulate script, revised as necessary.
Research Notes	Submitted a good set of research / interview notes.	Submitted a complete and thorough set of notes and revised them as necessary.

Bibliography /Source List	Submittal of bibliography / information source list by end of project.	Submitted and revised bibliography / source list with a complete set of names, titles and addresses of all sources of information.
Timeliness in Meeting Deadlines	Submitted all work in a timely manner.	Met all deadlines in submitting work.

STS Second Quarter Evaluation

(E = Excellent, S= Satisfactory, U = Unsatisfactory)

INDIVIDUAL WORK

Evidence required for grade conferences are in italics

Comments	— Evaluation — Student	Teacher
Journal Work 1st half (*Journal Evaluation sheet*)	_____	_____
Journal Work 2nd half (*Journal Evaluation sheet*)	_____	_____
Shadowing Essay	_____	_____
Workshops (*Journal*)	_____	_____
Exam Essay	_____	_____
Evidence of Learning	_____	_____
Technical Requirements	_____	_____
Clarity of Writing	_____	_____

Grade for Individual work: ☐

PERSONAL OUTCOMES

Comments	— Evaluation — Student	Teacher
Self-Directed Learning (*Task logs, research notes*)	_____	_____
Time Management/Organization of Materials (*Journal, Task Logs, Portfolio*)	_____	_____

Grade for Personal Outcomes: ☐

TEAM PROJECT WORK
(To be evaluated by *peers* and teacher)

Project Milestones

	Comments	— Evaluation — Team	Teacher
Project Treatment / Outline		_____	_____
Storyboard Outline/Storyboards		_____	_____
Edit Log (for video projects only)		_____	_____
Bibliography / Source List		_____	_____
OVERALL GRADE FOR BINDER		_____	_____
OVERALL GRADE FOR RESEARCH		_____	_____

Grade for Project Milestones: ☐

Final Team Product

	Comments	— Evaluation — Student	Teacher
Depth of Content		_____	_____
Technical Quality		_____	_____
Entertainment Value (For presentation)		_____	_____

Grade for Final Product: ☐

EVALUATION SUMMARY

Student Comments:
Accomplishments:

Challenges:

Attendance/Tardiness:
Number of Unexcused Absences: _____ Number of Tardies: _____

Civic Contribution:
Honors credit? (Y/N) _____ Contract Completed? (Y/N): _____

Grade for 2nd Quarter: _____ _____ _____
Student Teacher Negotiated

_____ _____ _____
Student signature Teacher Signatures

	1st Quarter (40%)	2nd Quarter (60%)	Semester
Grade Summary:	_____	_____	_____

Netscape Project Evaluation

NETSCAPE PAPER

Depth of Understanding

Clear, thorough overview of topic _____

Good, factual data / examples _____

Informative for the reader _____

Appropriate, informative graphics (Optional) _____

Clarity of Writing

Well-organized _____

Interesting / entertaining _____

Good flow _____

Good annotations for FFIs _____

Technical Quality

Met all formatting criteria _____

Grammar and spelling _____

Sufficient FFIs _____

RESEARCH BINDER:

Research _____

Annotated Bibliography _____

Organization _____

Timeliness _____

STS 4th Quarter Evaluation

INDIVIDUAL WORK

	— Evaluation —	
	Student	Teacher
Journal Work (*Credits earned:*_____)	_____	_____
Workshops (*Credits earned:*_____)	_____	_____

Overall Grade for Individual work: ☐

PERSONAL OUTCOMES

	— Evaluation —	
	Student	Teacher
Self-Directed Learning	_____	_____
Time Management/Organization of Materials	_____	_____

Overall Grade for Personal Outcomes: ☐

PROJECT WORK
(See attached sheet)[4]

Overall Grade for Project Work: ☐

ATTENDANCE / TARDINESS
Number of Unexcused Absences: _____ Number of Tardies: _____

CIVIC CONTRIBUTION
Honors credit? (Y/N) _____ Contract Completed? (Y/N): _____

---

[4] Students could chose one of several formats for their fourth quarter research project, including a website, a paper or a video. Those who produced papers and websites also did a presentation. Those who made a video, showed it during class. The evaluation form for each student differed based on the form of the final product they chose to produce. An example of one of these evaluation forms, the one used for research papers, is provided in this appendix.

GRADE FOR 4TH QUARTER: _____ _____ _____

Student Teacher Negotiated

_____ _____ _____

Student signature Teacher Signatures

Fourth Quarter Research Paper Evaluation

RESEARCH PAPER

Depth of Understanding

Clear, thorough overview of topic _____
Good, factual data / examples _____
Informative for the reader _____
Appropriate, informative graphics _____
(Optional)

Clarity of Writing

Well-organized _____
Interesting / entertaining _____
Good flow _____

Technical Quality

Met all formatting criteria _____
Grammar and spelling _____
Sufficient footnotes _____
Bibliography _____

RESEARCH BINDER:

Research _____
Bibliography _____
Organization _____
Timeliness _____

PRESENTATION:

Informative _____
Well-organized / prepared _____
Answered questions well _____
Entertaining _____

APPENDIX G: HANDOUTS AND ARTIFACTS FROM ROGER WOLFE'S CLASS

How To Do an Earth Science Project

Scientists try to understand the world around them. They do this by trying to figure out "how things work." To do this they usually have to make measurements and observations. The more careful they are, the better their "data" is. Then they try to figure out what the measurements and observations mean, keeping in mind the "laws of nature" that control everything around us.

You are going to act as scientists, and "explore" the workings of Earth Science "phenomena." You are not being asked to solve all the world's problems, or unravel the Ultimate Mysteries of the Universe. But your research will be "original" to some extent, because if somebody already knows the answer to your "question," you don't really have a question. Basically, you're going to be looking at how do things work? What proof (data) can you find? Can you "convince" your classmates that you have really "figured it out?"

How do we go about this process? Scientists start in many different ways. Some of them have questions that "pop up in their heads" so to speak. Things they have "always" seemed to want to know about. They want to know "why" things happen. Sometimes, however, the opposite happens. Some scientists see what is "usually" happening, and notice that it doesn't "always" happen. They try to figure out "why doesn't it always happen?" Sometimes scientists stumble upon new things while looking for something entirely different. Or, they might be given an area of research by their "boss," to see what they can find out. All of these are ways to do science.

The important parts of doing a project are:

** THE QUESTION, which is what you are trying to find out about some phenomena;

** THE METHOD, which is what you actually do; this could be an experiment, or it could just be a description of how you collected and analyzed your data to answer your question;

** THE DATA, which is the information you collect, usually information in numerical or visual form, from which a conclusion can be drawn. This can either be data which you would collect by observation or experimentation, or by collecting and using someone else's data;
** THE CONCLUSION you come to, based on the data you collect.

Here are the steps we will use to do our projects, with time "guidelines" for each step of the process. These time guidelines are not entirely "set in stone."

1) Find a BROAD TOPIC in Earth Science that you are interested in. (1-2 Days)
   a) Is there an Earth Science topic that interests you? (Volcanoes? Floods?)
   b) Can you use any available information sources to discover "anomalies?" — things that are different from the usual?
   c) What are your own interests in life (sports, photography, music)?
      – Can you find a way to combine your interests with Earth Science?

2) Find a research partner or partners. **GROUP MAXIMUM SIZE=3** (1-2 Days)
   a) It could be someone in your class, any of the other Earth Science classes here at [Lakeside], or any of the CoVis classes at schools across the US.
   b) Your partner(s) should really want to explore the same topic that you do.
      – Remember, you don't need an "anchor" you need a "partner."
      – Use e-mail, personal conversations, CoVis newsgroups to find them.

3) Do background material research. (2 weeks)
   a) You need to find out the way things work. For example, if you were interested in "caves," you need to find out how they are formed, where they form, what rocks do they form in, how long does it take for them to form?
   b) You need to know enough about the topic to be able to explain it to someone else, so that they understand the basics too.
   c) You have to do some reading in Earth Science or other specialized science books, encyclopedias, etc., to get this background information. Some may be available on the Internet.

4) Narrow your broad topic into a research proposal. (1 week)
   a) You don't have to actually find data in this part, just come up with an idea for something to explore.
   b) What is it about your broad topic that is most interesting to you? Maybe your fascinated by the fact that caves only form in certain states, or maybe there is one near your vacation home in Wisconsin.
   b) Be sure that your research idea is "do-able." No trips to the end of the galaxy to collect data!

c) You need to find an idea that you can "test," "measure," "experiment on" (this is called "collecting data"), or be able to find existing data to "support" or "prove" your research idea. It basically has to be *small enough to do*. Finding the "cure for acid rain" or "how to stop planetary greenhouse warming" might be topics that are a little too large to handle. You don't have to collect all the data yourself!! There are hundreds of scientists in the world working on lots of different research projects. Somewhere there might be someone collecting (or has already collected) the data that you need. This is where the library, telephone, and CoVis communication tools come into play.

5) Figure out how you are going to try to answer your question.
   a) What do you already know about the topic?
   b) What other questions about the topic come up?
   c) What information do you need to find the answer to the "question" you have asked?
   d) Where do you find the information you need?

6) Collect Data. (2 weeks)
   a) Use all the resources available to you.
      – Library books, periodicals, journals, personal conversations, data bases, images, Images, whatever it takes, whatever you can find.
   b) This might also be experimental data your group collects.

7) Analyze your data to see what you have discovered. (1 week)
   a) Graph your data to make any patterns/connections more "visible."
   b) What does your data tell you?
   c) Does your data "support" what you started out to "prove?"
   d) Does the data "explain" the phenomena you were exploring?
   e) If the data shows something "different" that what you expected, why?
      – This might be the "real" project!!!

8) Write a paper explaining your project. (2 weeks)
   – See the separate handout.

9) Prepare a presentation to the class. (1 week)
   – There will be more information about this later.

Project Reports

The following reports are required from each **GROUP**:

1. **Written report.**
   Length: as long as you need it to be to inform the class about your project.
   Typed, double spaced. 10 point type. (this text is 10 point type)
   Graphs, **diagrams** and **charts: each report must have one or more Data Tables** to logically/neatly present your data. **Each report must have one or more Graphs/Charts** to help you visually present the findings of your data analysis. The spreadsheet program, Excel will aid you with tables and graphs/charts. Diagrams should be included in the paper if they help to illustrate a point or explain a process. These items **should be placed in the "body" of the report** along with the text (like a book or a newspaper), instead of on a separate sheet of paper. If it isn't possible to include the tables, charts or diagrams directly in the paper, they should be as close to the text that refers to them as possible, and not at the end of the paper. Be sure to **1)** label them ("Table 1," or "Graph 1," or "Diagram 1," etc.), and **2)** include a descriptive caption ("Graph showing the relationship between . . ."). All diagrams/tables/charts must be typed, computer generated, or copies from reference materials. If copied from another source be sure to quote the source in, or immediately after, the caption ("Graph from Press, 1987"). If you have to attach an illustration to a page, it should be glued neatly (rubber cement preferred), not taped or stapled.
   Format: This report should follow the format below.

2. **Class presentation.** This presentation allows you to share your research with the class. Basically, it should include: **1)** your original proposal/question, **2)** the information from your "Introduction," **3)** your "Method," **4)** your "Conclusion." You need to describe your project goals, tell how you did your research or collected your data, and an analysis of your data (your results). Visuals are encouraged. Computer images, or overhead transparencies would be best. Posterboards will be allowed on the first project, but every item on them must be clearly visible to everyone in the audience. No drawings on the chalkboard, except during the questions and answers.
   Time. Each presentation will be limited to 15 min, followed by a question/answer period.

RESEARCH PAPER FORMAT

Each paper must have each of the parts listed below. Each section, excluding the "Title Page," must be clearly labeled in your paper. There may be more than one section on each page, except for the title page.

1. **TITLE PAGE**

   This page should include the title of your project, names of the authors, and date submitted.

2. **ABSTRACT**

   This section is a brief summary of your work. Be brief. This is sort of like a "movie review" for the potential reader. It includes: **1)** your Proposal (project idea/question), **2)** a description of how you went about answering your question, or doing your research, and **3)** your Conclusion. This should not be more than 200 words long. The abstract gives the reader a quick overview of your project, so that he/she can decide from the abstract if he/she needs/wants to read the rest of the paper.

3. **INTRODUCTION** (Background material/information)

   Gives all the background (but no more) necessary to understand why the investigation was needed or worthwhile, and how and why the results would be significant. It should clearly lay out the questions that needed answering, the problems that needed to be solved, or the system or object that needed to be designed, in order to help the reader appreciate what the writers have done. In a scientific journal, an important part of explaining the importance of a study is citing past literature in the field that shows that while the writers' contributions are original, they are built upon the work of the past.

   Be sure to use scientific citations when necessary. See pages 30 and 49 in the "Style Manual for Research Papers."

   IMPORTANT NOTE: change the "page #" to the "year of publication" in all internal citations.

   For example, "if you quote something directly from an author, you would write his/her name and the year of publication, as shown here (Wagner, 1996)." Basically, whenever you use an idea or quote an author, it must be documented in your paper, and there must be a full citation in your Literature Cited.

4. **METHOD** and **RESULTS**

   In this section you explain the strategic actions you took in doing your research. This section should make a sincere effort to strain out the mundane (worldly, boring) details of the work done, in favor of hitting the highlights that distinguish this paper from others. In particular, it should avoid a lot of

storytelling about going to the library, searching the Internet, or learning to use software.

For example, let's say you were going to do a project where you were trying to show if there was/is a pattern to the eruption of geysers in Yellowstone Park.

This section might start out, "In order to answer our question, we found a map showing the locations of all the geyser basins in Yellowstone Park, see Map 1. Then, we needed the times of eruptions for all of the geysers, see Table 1, so we could see if there was a correlation between the times of eruptions, and the locations of the eruptions. To do this, we plotted the locations of all the geysers for which we found eruption data, onto Map 1. See Map 2. Then we looked at each basin individually to see if there was a pattern of eruptions. We did this by listing each of the geysers in 'geographical order,' that is, from North to South, or East to West, within each basin. We graphed the geyser location versus the eruptive time, to see if there was a pattern. We did this for each of the basins. Then we compared the geographic placement of all the basins in Yellowstone with the times of eruptions."

Then, you set out data and/or secondary research collected according to the methods used, and present an analysis of them. **This analysis should take a clear stance on the interpretation of the data, and <u>provide a coherent argument</u> for your interpretation**. In order to do this, you should discuss other possible interpretations of the data, or flaws in them, and attempt to be even-handed in measuring them up. Identifying where the major points of doubt lie and how they could be resolved if they haven't been.

6. CONCLUSION (Results)

In this section, the writers should return to the original motivations of the work that were mentioned in the Introduction, and sum up what the study has accomplished in relation to them. This is sometimes where papers seem to run out of steam, falling back on platitudes or rhetorical flourish. The key here is for the writers to stand back a bit from what they've done and put it in a wider context, to discuss its ramifications. If you started your project with a specific point to prove or disprove, does the data you collected and analyzed support your original proposal/question? Or, did your analysis appear to be contradictory to what you thought it would be? If you were just trying to find out how something worked, or how things were related, what did you find out?

7. LITERATURE CITED

This is where you document all sources. <u>Anything you use that was created by someone else must be listed here</u>. To create a Literature Cited, follow the format in the Edgewater Style Manual for Science Citations (or, maybe even talk to an English teacher[!], librarian, or science teacher). <u>Be sure to include all the information you got electronically</u>. The format we will use will be:

Author (last name first). Date of document or download. Title of Web Page. [Online] Application used. URL address

Schimmrich, Steven H. 1995. The Structural Geology Home Page. [Online]. http://hercules.geology.uiuc.edu/~schimmri/geology/structure .html#data

Be sure to include your mentor if you have one, and personal conversations where you got information that you use in the research. Basically, if there is something in your paper that you got from someplace other than being made up in your own brain, there should be a reference to it here!

How you paper is graded.

TITLE PAGE	**(5 Pts)**
ABSTRACT	**(10 Pts)**
INTRODUCTION	**(20 Pts)**
METHOD, DATA ANALYSIS	**(10 Pts & 10 Pts)**
CONCLUSION	**(20 Pts)**
LIT. CITED	**(10 Pts)**
STRUCTURE(spelling, sent. structure, internal cit.)	**(10 Pts)**
TOTAL POINTS =	**(95 Pts)**

APPENDIX H: HANDOUTS AND ARTIFACTS FROM CAROL PATTERSON'S CLASS

Global Warming: Project

Now that we have completed several introductory activities dealing with the global warming issue, I think we all agree that the subject deserves deeper investigation. There are numerous scientific, social, political and economic aspects of global warming which can be explored in detailed and meaningful ways. Some examples of projects from last year are:

- The Scientific Foundations of Global Warming:

  The group investigated the mechanism by which surface temperature on earth increases, how and why certain atmospheric constituents cause warming, the connection between CO_2 and temperature, where the CO_2 is coming from (broken down by emissions per country), how the carbon cycle fits in the global warming scenario, what the connection is between CH4, CFCs, and other gases and temperature, what the patterns of change are over the past century, what cause and effect relationships are, what a "statistically significant" result is, has the avg. global temperature changed in the past century or several centuries and how do we know what we know about this issue?

- Research Issues:

  The group investigated the kinds of research being done to explore/test global warming theory, who funds global warming research, how much the US (National Science Foundation) is spending in terms of grants for this research, how grants are awarded, what "peer review" means, how research ideas and results become known to the scientific community, how they become accepted, when and how these theories become the "dominant paradigm," and the relationship between global warming research scientists and the Media.

- Political Aspects:

  The group investigated the U.S. policy on global warming, whether perspectives on global warming fall along party lines, how the views of the Clinton administration and those of Newt Gingrich and Congress compare, the relationship, if any, between party and funding of research for this issue, whether GW will be a campaign issue in ’96, the relationship between politicians and scientists, and how many Senators/Congressmen have scientific backgrounds.

- Computer Models:

  The group investigated computer modeling for GW, what the dominant General Circulation Models (GCM) are as of 1996, what variables are used in the models, what kind of computers/equipment are required to run these models, what the limitations, if any, are of these models, how the models are tested, what the models predict, whether there are differences in the CGM model predictions and if so, why, and what feedback mechanisms (increased water vapor, cloud formation, etc.) are used in the models.

- Media:

  The group investigated what effect the print, TV and radio Media have had on the public’s perception of global warming, what analogies and metaphors are used in reports about global warming, what rhetorical techniques are used, how the nature of TV/TV news impact the information available to the public, whether scientific “press conferences” changed the way scientists make the work/results known, the relationship between scientists and the Media, how many journalists have science backgrounds, and has the global warming issue received as much press/more/less press than other environmental issues.

- Relationship to the Third World:

  The group investigated what kinds of relationships we have with developing countries, what voluntary or mandatory global environmental treaties have been initiated by the U.S. that impact the Third World, what the World Bank is, what the International Monetary Fund is, what do developing countries contribute in terms of greenhouse gases or agricultural practices that may enhance global warming, do wealthy nations have a responsibility to promote growth/progress in the Third World, do wealthy nations have a responsibility to limit growth/progress in the Third World in an effort to decrease the possibility of global warming, how do global warming scenarios for poor areas of the world compare to those in wealthy countries?

You may draw upon these ideas of come up with something new. For example:

- Adopt the interests of a particular country and explore all the ramifications of GW for your area and recommend logical courses of action/inaction.
- Consider the dilemma of an executive with a prominent insurance company and decide whether to offer GW insurance policies for certain areas, based on cost/benefit analysis.

Whatever your topic, you must be able to show that you can realistically **collect and analyze data to support your thesis.** This does not mean you have to produce a traditional science project. As long as you collect, organize and analyze data and draw reasonable conclusions based on research and your own findings, I will consider that to be a scientific endeavor regardless of the topic. You should try to reach a consensus with your group with regard to your topic and **turn in a proposal to me by Friday Feb. 23**.

Expectations:

Research groups:
- A maximum of 3 students per group
- Groups are self-selected
- Each group should research their topic collaboratively (you will be graded individually as well as be given a group grade).

Mentors:
- You will b assigned mentors and you will be expected to communicate with them on a regular basis, including providing them with updates on your progress so they know where you are headed and how they can better assist you.

Paper:
- 7-8 page formal paper with Literature Cited section.

Presentation:
- 15 minute seminar to your classmates. (This must be tight. You will not be allowed to exceed this time limit.)

Time Frame:

- Proposal due Friday, Feb. 23
- Research update (in writing) Friday, March 1
- Outline of paper due Friday, March 8
- Rough draft of paper due Wed., March 13
- Presentations on March 20-22 (paper due when you present)

Evaluation:

Group cohesiveness:	25
Individual contribution:	25
Mentor relationships:	25
Paper:	130
Seminar:	65
	Total: 270 points

Sample of Carol's Written Response to a Group Project

Global Warming Open-ended Project

Group: ***Jason, April & Ryan***

Topic: ***US and Brazil: Limiting CO2 Emissions***

Your topic was a challenging one, requiring a sophisticated synthesis of numerous bits of data/ information. When we discussed your proposal early on in the project cycle, we agreed that the expectation for generating original data or using data found in the literature would be lowered since the "project" was doing an original analysis of the information on both countries that would be acquired by your group. While you made some recommendations with regard to capping CO2 emissions for the US, they were without substantiation or rationale (beyond stating that the US is a major emitter and should therefore be required to reduce emissions). You also implied that the US would suffer economically should reductions be required by law, yet you cited no source nor gave any estimates regarding reduction in GDP, loss of domestic jobs, cost of developing and implementing alternative fuels, etc.

Your idea of staggering US and Brazilian CO2 emission standards was very interesting and deserving of deeper exploration. I was a bit confused by your logic when you suggest that putting absolute limits on CO2 emissions would allow Brazil to emit "an excess of CO2", yet at the same time limit growth in terms of industrialization and expansion. (see comments in paper). Deforestation was also an important element to factor into your decision and I'm glad you gave the issue some coverage. There were some problems, however, in your analysis of CO2 sources and sinks. Remember the carbon cycle is in dynamic equilibrium! Deforestation impacts global warming because trees no longer act as carbon sinks, but unless they are burned

(for biomass heating in homes, usually) or allowed to simply sit and decompose, the carbon is not released over the short term. Remember that the end market for much of that lumber is for building materials, furniture, etc. which will presumably have a fairly long life. If you have data to suggest much of the lumber is actually being consumed as fire wood you should have provided that. Just be careful when you use terms like "CO2 emitted by tropical deforestation . . ." — it leads to confusion!?!

Your presentation was solid and gave a nice overview of the First World-Third World dilemma. There were obviously some inequities in the presentation time of the group members and I couldn't help but wonder if certain elements were missing because of this (international and domestic CO2 emission standards? Existing agreements, laws, legislation under consideration?)

Group cohesiveness:	20/ 25
Paper:	96/ 130
Individual:	/25
Seminar:	54/ 65
Mentor Relationship	NA
Total:	**/245**

APPENDIX I: HANDOUTS AND ARTIFACTS FROM GARY MAGI'S CLASS

STS 3rd Quarter Culminating Essay

Objective: To demonstrate an understanding of the complex issues surrounding energy use and its environmental consequences.

The Question: What do you think are the best ways to produce energy now and in the future?

Guidelines:

- The essay will be written in the computer center on Tuesday, March 26th. It is due by the end of the class on that day. We will meet at the computer center, not in the classroom, and you can begin immediately.

- We would prefer you to word process your essay, but if you feel that you would not be able to type the essay during class time, you may hand write it *neatly*.

- You may use your journal and a prewritten outline as resources.

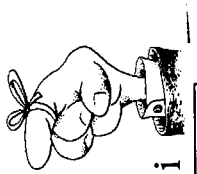
- Grading of the essay will be based on depth of understanding of the topics we have discussed this quarter. We will be looking for an overview of the various topics, sufficient detail to document your point of view, and a minimum of unsupported opinions.

- An "A" paper will include a clear, well-written summary of the pros and cons of various energy alternatives, and will include discussion of a minimum of three of the general topics that we covered this quarter: Nuclear power, fossil fuels, renewable energy sources, transportation issues, global warming and other environmental concerns, population and the production of food. It must also be proof-read, spell checked and have a proper heading and title.

- Your point of view should be supported with specific examples from:
  - Your Netscape research
  - Videos we watched in class
  - Workshop readings / discussions
  - Research for the Town Meeting
  - The Town Meeting itself

Sample Workshop Calendar for Third Quarter

The calendar below shows what workshops are available to students as well as regular deadlines for their webpage projects from February 12, 1996 to March 5, 1996.



S.T.S CALENDAR - 3rd Quarter

Mon	Tue	Wed	Thu	Fri
12 ***– NO SCHOOL –***	13 ***WORKSHOP: Electric Circuits***	14 ***WORKSHOP: Electric Circuits***	15	16 ***BINDER CHECK #1***
19 ***WORKSHOP: Renewables***	20 ***WORKSHOP: Radiation***	21 ***WORKSHOP: Nukes: How They Work***	22 ***WORKSHOP: Nukes: Pros & Cons***	23 ***BINDER CHECK #2***
26 ***WORKSHOP: Transportation***	27 ***ROUGH DRAFT DUE***	28 ***WORKSHOP: Global Warming***	29 ***WORKSHOP: Population***	1 ***BINDER CHECK #3*** ***WORKSHOP: Politics of Food***
4 ***– NO SCHOOL –***	5 ****PROJECT DUE**** 	6	7	8

STS Third Quarter Project: Energy and the Environment

STS 3rd Quarter Project:
Energy and the Environment

During the third quarter of STS, we will be exploring the sources, uses and environmental consequences of energy. We will be researching these topics in teams or as individuals using library and Internet sources. The ultimate objective is to publish a Netscape page describing our findings and giving connections to the rest of the Internet for further information. In other words, someone browsing our page should be able to learn about the basic issues surrounding energy and the environment and also have access to many sources of other information throughout the Internet.

We will be completing the research portion of this project tin three weeks. The final deadline for submittal of research binders will be on Friday, March 1. Binders should include sections for: 1) weekly progress reports, 2) task logs, 3) research notes, 4) scripts for the final Netscape page, and 5) a bibliography.

After the research phase, several students will actually create the Netscape page as a civic contribution. Other students will continue to work on a second project, either extending the research from the first project or moving on to other topics.

A list of possible research topics is included. Within each topic, good research should include economic, social and political considerations as well as the nuts and bolts understanding of how these systems work.

Overview of Topics

Non-renewable Energy Sources

(4)[5] Fossil Fuels
- Coal – mining, health issues, powerplants
- Oil – Off-shore sources, transportation (tankers, pipelines), storage
- Natural gas

(4) Nuclear Power
- Construction / function[6]
- History / Safety record

(1) Power distribution – high voltage distribution grid, substations

Renewable Energy Sources

(2) Wind power
(2) Active solar
(3) Photovoltaics
(1) Ocean Thermal Energy Conversion (OTEC)
(2) Biomass
(2) Geothermal power
(3) Hydroelectric power
(2) Nuclear fusion
(2) Breeder reactors[7]

Energy Uses

The future of transportation
- (3) Electric cars, hydrogen cars, high efficiency cars
- (1) Maglev trains, bullet trains
- (1) Blimps, dirigibles

Energy efficiency / conservation
- (2) High efficiency motors, appliances, lighting
- (2) Superinsulated houses
- (1) Underground houses
- (3) Passive solar architecture

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[5] Each parenthetical number is a handwritten addition.

[6] The word “function” is a hand written addition.

[7] “Breeder reactors” was a hand written addition.

Environmental Issues

(6) Greenhouse effect / Global warming
(3) Ozone depletion
(3) Acid rain
(4) Nuclear waste
(2) Nuclear accidents – Three Mile Island, Chernobyl, etc.
(1) Decommissioning of nuclear power plants
(2) Deforestation
(3) Ground level pollution
(2) Oil spills
(1) Environmental terrorism
(1) Electromagnetic radiation

Political Issues

(2) Federal funding / policy for nuclear, fossil fuels, renewables
(2) The Green Party in Europe
(3) Oil and international affairs (Kuwait, Desert Storm, etc.)
(2) Environmental activism (Greenpeace, monkeywrenching, etc.)
(1) Earth Summit In Rio[8]

[8] "Earth Summit in Rio is a hand written addition.

STS Third Quarter Project: Deadlines Handout

STS 3rd QUARTER PROJECT:
ENERGY AND THE ENVIRONMENT

WARNING! The following deadlines require that you work consistently and intensely for the next three weeks in order to complete the project successfully. Plan ahead!

MILESTONE	**DEADLINE**	**DONE?**
Finale group and topic choice	Wed., February 7th	
BINDER CHECK: Progress Report #1 At least 5 *useful* research notes per person	Fri., February 16th	
BINDER CHECK: Progress Report #2 At least 10 *useful* research notes per person** Annotated bibliography	Fri., February 23rd	
Rough draft of TEXT turned in	Tues., February 27th	
BINDER CHECK: Progress Report #3	Fri., March 1st	
FINAL PROJECT	Tues., March 5th	

** Of each student's **10** useful research notes...
. . . at least **3** should be library sources (books, magazines, videos, etc.)
. . . at least **3** should be internet sources
. . . ALL should be good sources that you have determined to be relevant and useful to your research (your note sheets should have a *significant* amount of notes from each source).

Sample Set of Workshop Journal Questions

Workshop: Nuclear Power – Pros and Cons
Date: Friday, February 22, Periods 1&2, 7&8

– JOURNAL QUESTIONS –

Reminder: *You must have read the three items below and answered the following questions in your journal in order to attend the workshop.*

"Nuclear Energy: Benefits for all Americans"

1. What are the most significant benefits of nuclear power plants?

2. What states have the highest percentages of nuclear power use? What nations have the highest percentages?

3. In what ways does nuclear power reduce economic and environmental problems for the U.S.

"Nuclear Power Plant Safety"

1. According to this article, what are the arguments that nuclear power plants are inherently safe?

2. Do you agree with this argument? Why or why not?

"Nuclear Power: Past and Future"

1. What are some of the disadvantages to nuclear power plants that have caused not new plants to be ordered since 1978?

2. What has happened to the cost of building plants since the early 1970's?

3. What are the most serious safety issues surrounding nuclear power plants?

4. How much high-level and low-level nuclear waste is generated every year?

5. What is the earliest that the Yucca Mountain waste depository will actually be able to store nuclear waste? What is being done with it in the meantime?

STS Civic Contributions

A part of STS is the expectation that students taking the class for honors credit, as well as any other students that wish to improve their grade, will make a contribution to the well-being of this class, the school or the community. You will need to choose what you want to do, fill out a contract, and document the work you have done.

Possibilities for civic contributions include:

Creating an STS newsletter. This could easily be a team effort involving a number of people to work as editors, reporters, design and layout people, distribution people, etc.

Acting as a public relations person. This would entail informing Lakeside High School's Public Relations office of our activities in a timely manner, possibly looking for ways to publicize our activities and accomplishments on a wider basis, find outlets for displaying the final products of our major products (videos on cable TV, etc.), and making sure that contributors and friends are thanked properly for their efforts.

Acting as equipment manager for the class, as well as librarian for the books and periodicals available in the room.

Creating an STS film festival. Although we will be showing a number of movies during the year, there is a limit as to how much class time we can spend watching the likes of "Silent Running" and "Terminator." Therefore, if there is interest, we could find time periodically to watch additional favorite movies after school or evenings. These would obviously be strictly volunteer in nature, although there might be spin-off activities which could become part of the class for some students. (An analysis of the views of the future as portrayed in science fiction movies is one example.)

Helping to organize and working on the school's recycling program.

Educating teachers and administrators on issues regarding garbage and recycling.

Investigating the economics of and school's policy on using recycled goods in the school and drafting a report to the Board of Education.

Putting in extra time into the Habitat [for Humanity] project. (We will be working for at least three hours during class time.) This contribution would require serious effort during non-class time on the project.

Acting as a mentor to students in other classes after you have learned how to use some form of technology they need to know.

Doing independent research into topics related to those discussed in class and finding a way of conveying what you learn to the rest of the class in an informative and possibly entertaining way.

It's also possible to work on a combination of several "lighter" obligations below.

Helping as "lab assistant" with the set up or clean up of demonstrations and activities (like the electric circuits activity).

Helping with room clean-up and decoration.

Helping teach others, in a semi-formal way, some skill or knowledge that you already have, such as teaching someone how to use Clarisworks or email, or how to analyze their circuit breaker at home.

Becoming a technology "expert" about some topic of interest to you (like how to use the Xapshot camera or scanner) and serving as a reference for other people in the class.

We encourage you to be creative and come up with other possible activities that would serve as a civic contribution or honors contribution. Think of something that you would really like to do, talk to us about it, then do it.