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## Appendix A

### The Content, Scope, and Sequence of Major Content Activities During Study

<u>Classroom activity</u>	<u>Unit</u>	<u>Technology</u>	<u>Duration/date(s)</u>
1. Lab activity: "Passive Solar Homes"	Alternative Energy	Graphing calculator, CBL, and temperature probe	2 1/4 class periods March 20 - 22
2. Quiz: "Passive Solar Homes"	Alternative Energy		1/2 class period March 22
3. Video: "Geothermal Processes"	Alternative Energy	VHS video tape	1/2 class period April 3
4. Reading and discussion: Newspaper article on methane as an energy source	Alternative Energy		1/2 class period April 4
5. Computer simulation: "Rocks and Minerals"	Mineral Resources	Computer CD-ROM	Two class periods April 7 & 10
6. Quiz: "Mineral Deposition"	Mineral Resources		1/2 class period April 14
7. Lab activity: "Resource Depletion"	Mineral Resources	Graphing calculators	3 1/2 class periods April 17 - 25

8. Quiz: "Resource Depletion"	Mineral Resources	Graphing calculators	1/2 class period April 25
9. Lab activity: "Milling Lab"	Mineral Resources	Graphing calculators	2 1/4 class periods April 25 - 27
10. Research and writing: "Minerals Report"	Mineral Resources		One class period May 3
11. Test: "Mineral Resources"	Mineral Resources	Graphing calculators	One class period May 9
12. Video: "The Power of Water"	Water	VHS video tape	One class period May 15
13. Video: "Groundwater"	Water	VHS video tape	1/2 class period May 16
14. Lab activity: "Watersheds"	Water		Two class periods May 23 - 24
15. Lab activity: "Colorado River: Case Study"	Water		Two class periods May 25 - 26
16. Lab activity: "Eutrophication of Lakes"	Water		Two class periods May 26 & 28

17. End of Semester  
Exam

Graphing calculators June 5

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## Appendix B

### Passive Solar Homes Lab Activity

Lab \_\_\_\_: Passive Solar Homes

Name: \_\_\_\_\_

**A. Purpose** Passive solar structures are those that don't require pumps or other mechanical devices to circulate water or air for heating or cooling. Instead, they rely on the **design** of the structure and its surrounding for temperature regulation. Students will examine six different passive solar homes and determine which design is the most effective in stabilizing indoor temperature.

**B. Hypothesis** The solar home that will stabilize the indoor temperature the best is \_\_\_\_\_ because \_\_\_\_\_

**C. Materials** solar home, CBL, TI-83 calculator, temperature probe, directions for setting up the probes, stop-watch, lamp with 200 watt bulb

**D. Procedure**

1. Choose a house.
2. Follow the directions to set up the probe wear (CBL, calculator, probe)
3. Set up lamp so that the light is 25 cm. from the front of the house and angled directly at the front of the house.
4. Start the stop-watch when you turn on the lamp and begin collecting temp. data.
5. Turn off the lamp after 16 min. have passed.

**E. Data** Transfer data from your graphic calculator to the overhead projector. (I'll provide you with a graph of all six sets of data.) **Use the graph to answer the analysis questions below.**

**F. Analysis**

1. Which house design heated the fastest?
2. Which house design cooled the fastest?
3. Which house design kept the temperature the most stable throughout the thirty-minute period?
4. Was your hypothesis correct? Write the correct hypothesis here-The solar home that stabilized the indoor temperature the best was the \_\_\_\_\_ house because it \_\_\_\_\_
5. How did the thermal mass affect the temperature?
6. How did the heat sink affect the temperature?
7. How did the insulation affect the temperature?

**G. Conclusion** What features would you include in designing a passive solar home?

**H. Extension**

1. Look at the sheet provided on designs of passive solar homes. List four major design features of passive solar homes or their surroundings.
  1. \_\_\_\_\_
  2. \_\_\_\_\_
  3. \_\_\_\_\_
  4. \_\_\_\_\_

## Appendix B (continued)

### CBL + SOLAR HOME

1. Connect the CBL and calculator with the link cable using the port on the bottom edge of each unit. Firmly press the cable into each port. Connect the TI Temperature Probe into Channel 1 of the CBL.
2. Turn on the CBL unit and the calculator. Follow these steps to start the CHEMBIO program on your calculator:

TI-82 or TI-83 Calculators:

Press  $\text{2ND}$ , then press the calculator key for the *number* that precedes the CHEMBIO program (usually  $\text{1}$ ). Press  $\text{ENTER}$ , then press  $\text{ENTER}$  again to go to the MAIN MENU.

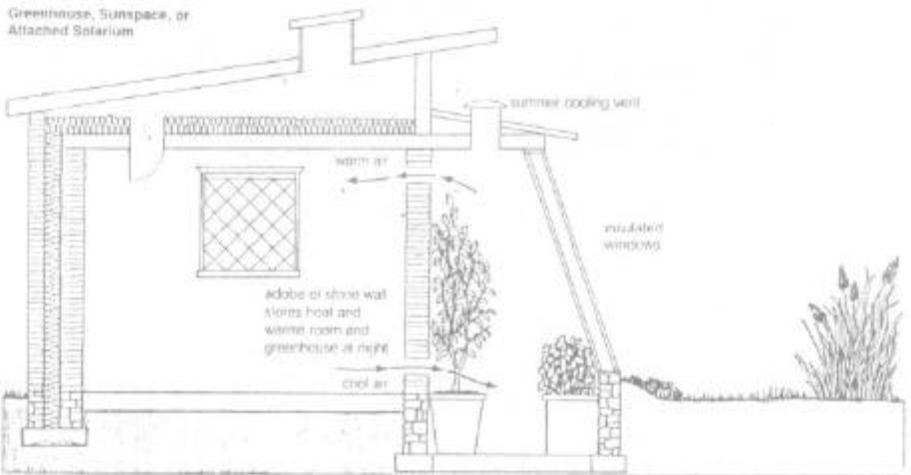
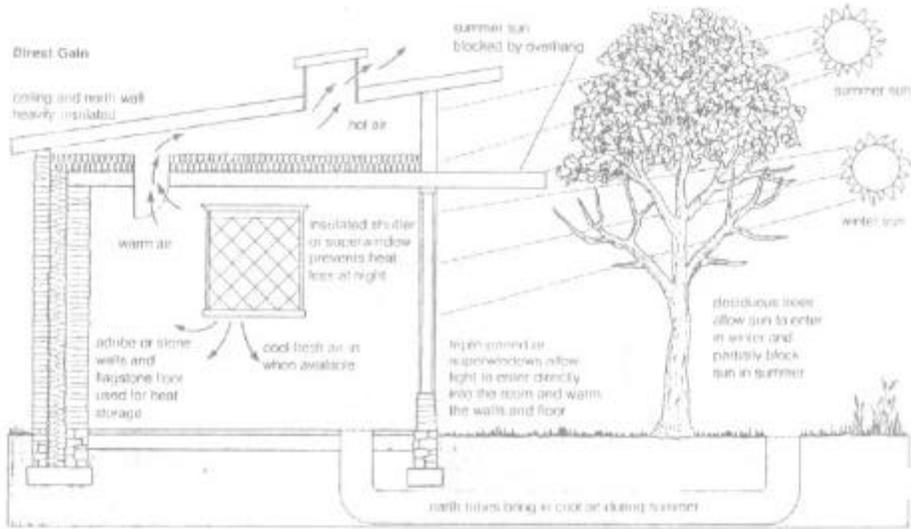
3. Set up the calculator and CBL for a temperature probe.
  - Select SET UP PROBES from the MAIN MENU. Note: To *select* an item from TI-82/83/92 menus, use  $\text{↓}$
  - Enter "1" as the number of probes. Note: To *enter* a value, type the number on your calculator, then press  $\text{ENTER}$ .
  - Select TEMPERATURE from the SELECT PROBE menu.
  - Enter "1" as the channel number.
4. Set up the calculator and CBL for data collection.
  - Select COLLECT DATA from the MAIN MENU.
  - Select TIME GRAPH from the DATA COLLECTION menu.
  - Enter  $\text{120}$  as the time between samples, in seconds. "120"
  - Enter  $\text{16}$  as the number of samples (the CBL will collect data for 2 minutes). "16"
  - Press  $\text{ENTER}$ , then select USE TIME SETUP to continue. Note: If you want to change the sample time or sample number you entered, select MODIFY SETUP.
  - Enter "0" as the minimum temperature (Ymin).
  - Enter "100" as the maximum temperature (Ymax).
  - Enter "10" as the temperature increment (Yscl). Do not start data collection until Step 8.
5. Place the temperature probe into the house as close to the center as you can get it. (You may have to use tape to keep it in place.) "Seal" the house with tape as best you can.
6. Press  $\text{ENTER}$  to display a graph of temperature vs. time on the calculator screen. Examine the data points along the displayed curve:

TI-82 or TI-83 Calculators:

Use  $\text{F1}$  or  $\text{F2}$  to examine the data points along the curve. As you move the cursor right or left, the time (X) and temperature (Y) values of each data point are displayed below the graph. Determine the initial and maximum temperature of the water. Record the temperature values in Table 1 (round to the nearest 0.1°C).

Appendix B (continued)

X.C. Lab 17.2 cont.



## Appendix C

### Resource Depletion Lab Activity

# Lab 25: Resource Depletion

Name \_\_\_\_\_ Date 4-17-00

**Purpose**  
To model the depletion of a natural resource, plot related graphs and interpret their meaning.

**Background Information**  
No natural resource is consumed at a constant rate. Instead, it usually goes through a production cycle that starts slowly, rises to a peak and then slowly diminishes as the resource is exhausted. Typical of this cycle is the history of oil. When oil was first discovered, its rate of consumption was very low. It was used as a lubricant and as a fuel for lamps. But as the years went by, people became more familiar with it and its properties. Its use expanded. Cars used it as their source of power, and mass production made mechanized transportation possible for millions of people. The consumption rate, and hence the production rate, rose exponentially. Then came the diesel locomotive, the airplane, trucks, asphalt, the motor cycle and minibike, heating oil, and the oil fired power plant. Exponential growth continued. But oil is a non-renewable resource, and the Earth and its resources are finite. Hence, the production rate must eventually peak and then decrease, also exponentially. This is shown in the cycle of world oil production illustrated below.

Cycle of world oil production is plotted on the basis of two estimates of the amount of oil that will ultimately be produced. The high curve reflects Ryman's estimate of  $2,100 \times 10^9$  barrels and the low curve represents an estimate of  $1,350 \times 10^9$  barrels. (From The Energy Resources of the Earth, M. King Hubbert. Copyright © 1971 by Scientific American, Inc. All rights reserved.)

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Appendix C (continued)

Note that oil consumption exhibited a slow beginning during the 1880's, and a primary usage during the 1900's. Reserve estimates and human behavior patterns imply a phasing out in the twenty-first century. Although a certain amount of guessing goes into projecting the latter portion of the curve, the information is valuable in that it can help us plan for the future.

Since the beginning and end of any resource depletion curve are so indistinct, many experts talk about the 80 percent lifespan (see graph). This is the period of time during which 80 percent of a resource is expected to be withdrawn. Generally, when 90 percent of a resource is withdrawn, the resource is considered exhausted. The remaining 10 percent is just too expensive to extract.

After you do the lab and complete your graphs, compare your findings to the history of oil.

**Assumptions**

1. The Earth and its resources are finite.
2. Demand for and consumption of our nonrenewable resources will continue to grow exponentially until it can't anymore.

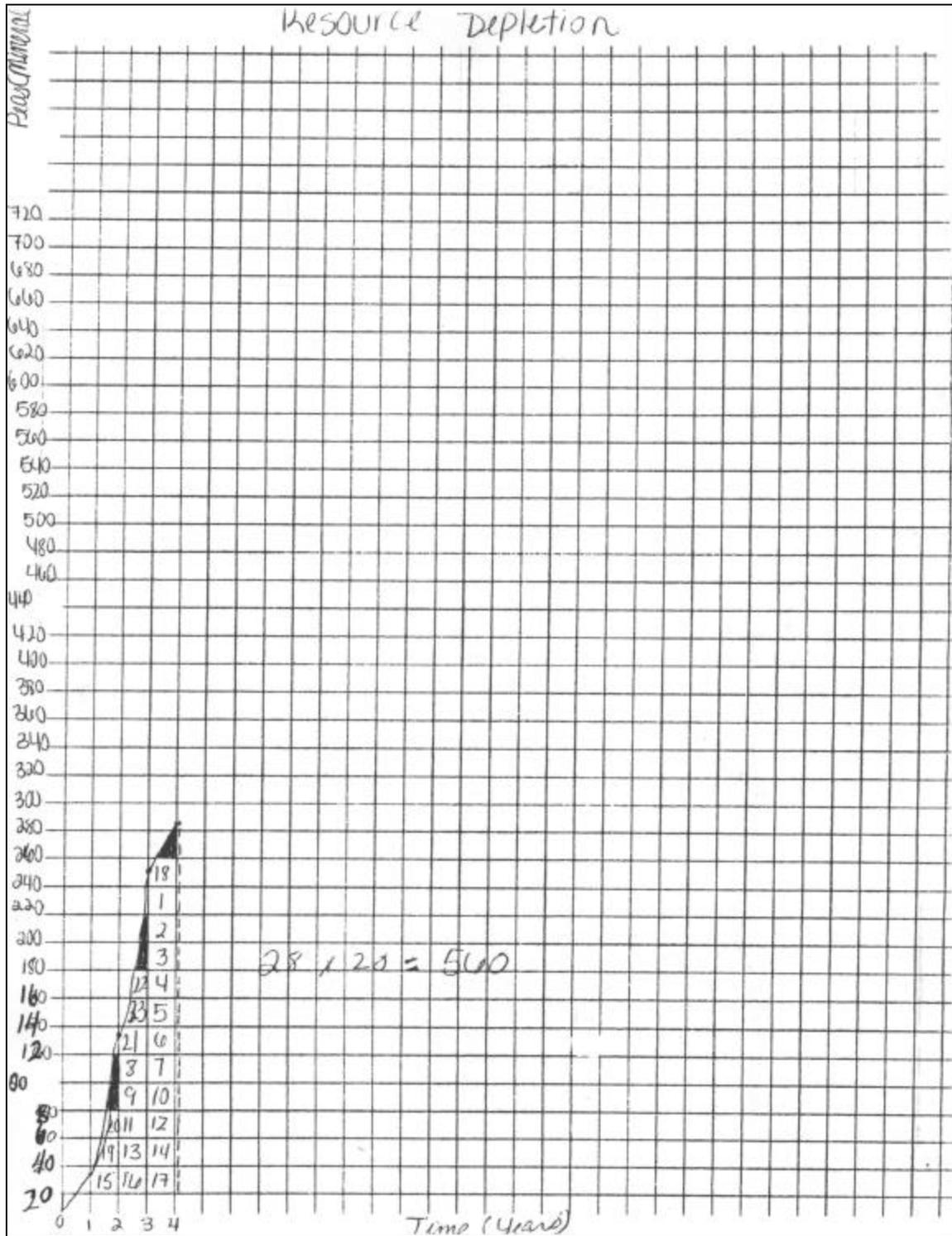
**Procedure**

The plastic box filled with dried corn represents the Earth. The dried corn represents the material of the Earth's crust—the dirt, the water, the minerals. The plastic beads represents an ore—anything that is useful to humans that can be extracted at a profit.

You and your fellow students will be the developers (the oil, coal and mineral companies). Fifteen (15) seconds of digging in the box will represent one year of production. During the first year, one person will mine in the box. The production rate will be the number of nuggets (beads) he (she) can find in one year (15 sec.). Because a profit is made, more companies become interested in exploration, so two persons mine the next year. Because profit was made and new uses for the resource were discovered, four persons mine the next year. The number of developers then increases to eight and possibly sixteen. Developers continue in business as long as they are able to net (after taxes) twelve nuggets/year. This is the minimum amount necessary to make a profit. Companies that are careless in their mining practices (as indicated by a mess on the floor) will be assessed an environmental damage tax which will be 40% of their total production that year (rounded off to the nearest *whole* nugget and is never less than one). Continue resource depletion until the production rate drops to approximately what it was during the first year of development. *Data: 15 sec. in the lab = 1 year of production.*

Time (years)	Number of Developers	Production-or-Rate of Resource Withdrawal (nuggets/year)	Total Resource Withdrawn (nuggets)
1	1	28	28
2	2	170	198
3	4	207	405
4	8	97	502
5		85	587
6			
7			
8			
9			
10			
11			
12			
13			
14			

Appendix C (continued)

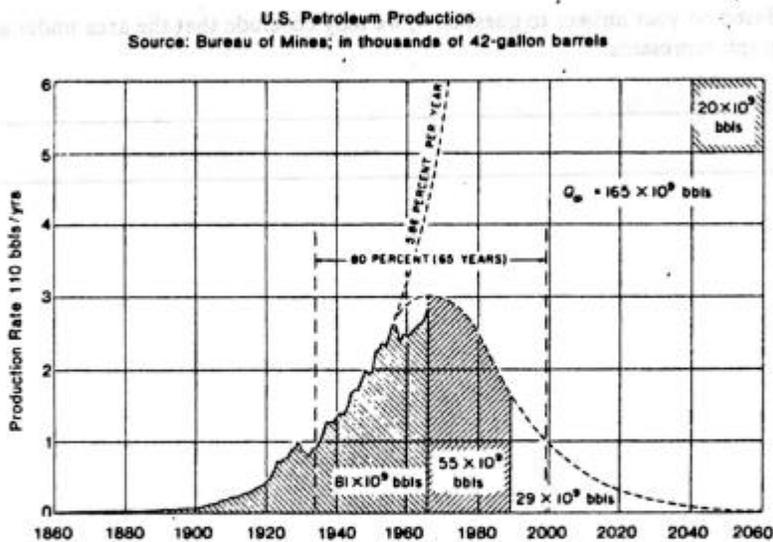


Appendix C (continued)

- Notes: 1. Since four people is about all you can crowd around the box, eight people is equivalent to four people mining for two years (30 sec.), and sixteen is equivalent to four people mining for four years (60 sec.). The number of developers usually never exceeds eight because as profit margins narrow, fewer companies go into the extraction business.
2. Total resource withdrawal is an accumulative summation of all the nuggets withdrawn. Your final number will be very close to the total number of nuggets in the box.

Graphs

- Divide a sheet of graph paper in half. On the left half plot a graph of Rate of Withdrawal (Production) vs. Time. On the right half plot a graph of Total Amount Withdrawn vs. Time. Write a conclusion for your graphs on the back of the graph paper. Turn in the graphs and conclusions tomorrow.
- Plot a graph of U.S. Crude Oil Production vs. Time (1925-1982) using the data provided below. Start the time axis at 1910 and extend it to 2030.



Complete cycle of crude oil production in the United States and adjacent continental shelves, exclusive of Alaska. (From Hubert, M. King: "Energy Resources." Resources and Man, Fig. 8.17, p. 183. Reproduced by permission of the National Academy of Sciences and M. King Hubbert.)

**U.S. Petroleum Production Exclusive of Alaska**  
(Source: Bureau of Mines; in billions of 42-gallon barrels)

1925	.78	1960	2.57
1930	.89	1965	2.84
1935	1.00	1970	3.43
1940	1.35	1975	2.99
1945	1.71	1978	2.73
1950	1.97	1980	2.55
1955	2.48	1982	2.54
		1988	2.24

Compare your graph to the graph and projection made by M. King Hubbert. Hubbert's projection (extrapolation) was made in the late 1960's. Does it seem realistic to you? Yes In what year does he predict that approximately 90% of the petroleum reserves in the U.S. will be gone? 2020

How old will you be then? 320 years. How should we prepare for this possibility?  
Find another available resource, (methane hydrate)

Appendix C (continued)

Lab Extension:

1. What does each box under your bell-shaped depletion curve represent? 20 nuggets.
2. How many boxes are there under the bell-shaped curve? 28 boxes. *Note:* You will need to estimate fractions of boxes and then add this to the number of whole boxes.
3. Multiply the number of boxes by the number of nuggets each box represents. Record your answer.  
33 boxes  $\times$  27  $\frac{\text{nuggets}}{\text{box}}$  = 660 nuggets.
4. How does your answer to question 3 compare to the number of nuggets the extrapolated top portion of the total Resource Withdrawn vs. Time graph approaches? The two numbers are Pretty close.
5. Based on your answer to question 4, we may conclude that the area under a resource depletion graph represents Resource Available.

## Resource Depletion Lab Activity Quiz

## Quiz: Lab-Resource Depletion

1. Which section of the resource depletion curve shows exponential growth? A, B, C, D
2. Which section of the resource depletion curve shows a period where there are few consumers because the resource is so new people don't know what to do with it? A, B, C, D
3. Which period of the resource depletion curve shows exponential decline? A, B, C, D
4. Give a reason for exponential decline.
5. The mineral you mined in the lab was peas/corn
6. The gangue (waste) in this lab was the peas/corn
7. At what percent of resource depletion is the mineral considered depleted for all practical purposes? 75%, 80%, 90%
8. What does the area under the curve of your resource depletion curve represent?
9. How did we prove this?
10. List 2 ways we can prepare for depletion of our energy resources like oil?

## Appendix E

### Timeline:

Spring 1999

Conducted pilot study

March 2000

Selection of study site and participating teacher(s)

Letters mailed to Division School Superintendent, Science Supervisor

IRB Approval

Distribution and collection of Informed Consent Forms

Began fieldwork (March 20)

April

Continued fieldwork

May

Continued fieldwork

June

Conclusion of field work (June 5)

Began data analysis phase

July - August

Continued data analysis

August

Began writing dissertation

September 2000 - November 2001

Continued writing until completion

December 2001

Defense

## Appendix F

### IRB Protocol Outline

#### Justification of Project

There is a growing trend in science and math education toward including technology in instruction. The national science and math reform initiatives (National Science Education Standards, 1996; Curriculum and Evaluation Standards for School Mathematics, 1989) placed emphasis on integrating math and science and the use of technology. According to the Virginia Standards of Learning (1995):

- Computer/Technology Standards are included in the Mathematics, Science, English, and History/Social Science SOLs. Therefore, the teaching of these skills should be the shared responsibility of teachers of all disciplines.
- Graphing utilities...calculators, computers, and other forms of electronic information technology are now standard tools for mathematical problem solving in science, engineering, business and industry, government, and practical affairs. Hence, the use of technology must be an integral part of teaching and learning.
- technology must be readily available and used regularly as an integral and ongoing part in the delivery and assessment of instruction and include instrumentation oriented toward the instruction and learning of science concepts, skills and processes. Technology, however, should not be limited to traditional instruments of science...but should also include computers...graphing calculators...probeware...as well as other emerging technologies.

This study is aimed at studying the culture of a science classroom in an attempt to better understand how teachers use and how students learn with probeware technology.

#### Goals

The goals of my project are:

1. To interpret what goes on in a science classroom where probeware technology is used.
2. To better understand how probeware is used as an instructional technology in teaching and learning science.
3. To advance alternative perspectives regarding the role of technology in the context of science classrooms.

#### Procedures

The main part of the study will be to conduct classroom observations, videotape classroom activities, and to conduct interviews with teachers in a local secondary science classroom. I have already discussed my project with a division science supervisor and she has made suggestions as to suitable teachers that might be contacted. My research plan has me at the cooperating school two or three times a week for the remainder of the school year.

I will spend most of my time observing, videotaping, and taking field notes, focusing on interactions in the classroom. Documents such as lab reports and tests will be viewed for analysis. I plan to interview the cooperating teacher on a weekly basis both formally and informally throughout the study. Students will be interviewed informally in the social setting of the classroom. I will audio tape and transcribe the interviews and destroy the tapes once the data has been transcribed.

### **Risks and Benefits**

Since participants control the extent of their participation in the study, answering only those questions they wish to answer, discussing only those issues they wish to discuss, the "risks" from participating in this project should be minimal. The benefits of the project may not be to the participants directly but I hope that by studying the use of probeware technology and the implications for science instruction, I can contribute to science teaching and learning and the use of technology.

### **Confidentiality/Anonymity**

Because these observations, tapes, and interviews will deal in some detail with activities in classrooms, it will be difficult if not impossible to maintain anonymity. I will destroy or erase all taped interactions as soon as it has been transcribed, and I will give participants pseudonyms.

### **Informed Consent**

See attached form for adult (teacher) and students and parents).

### **Biographical Sketch**

Dennis Casey is the sole investigator for this study. Mr. Casey taught high school science for twelve years in Roanoke County Schools. Mr. Casey is currently a Ph. D. candidate in curriculum and instruction at Virginia Tech. In his duties as graduate assistant and university mentor, Mr. Casey helps to train pre-service science teachers in the Science Education Program. Mr. Casey is a former president of the Virginia Association of Science Teachers and is currently serving as publications chair and web master. Mr. Casey is a member of the regional Appalachian Educational Laboratory training team and has led workshops on using technology in the classroom. Mr. Casey created and maintains web sites for the Science Education Program at Virginia Tech and for the Virginia Association of Science Teachers.  
(<http://www.tandl.vt.edu/acasey/caseymain.htm>)

This research project is being conducted to fulfill dissertation requirements chaired by Dr. George Glasson.

## Appendix G

### VIRGINIA POLYTECHNIC INSTITUTE AND STATE UNIVERSITY

#### Adult Informed Consent Form

##### PURPOSE

Over the last three years, probeware technology has become prevalent in math and science classrooms of Virginia. The use of this technology is included in the Virginia Standards of Learning. As yet however, relatively little is known about how these instructional technologies fit into the culture of the science classroom. The main goals of this study are:

1. To portray what goes on in a science classroom where probeware technology is used.
2. To better understand how probeware is used as an instructional technology in teaching and learning science.
3. To offer alternative perspectives regarding the role of probeware technology in the context of science classrooms.

##### PROCEDURES

I would like to make regular, scheduled, observations of your classroom when it is convenient for you. The observations will be in related to how probeware technology is used and talked about in the classroom. I will take notes in a confidential notebook that will be destroyed once the project is over. With your approval and prior notice, I would like to use an audio or video tape recorder to record activities that go on in the classroom. I would like to conduct at least one, possibly more, open-ended interviews with you, scheduled at a time and place convenient to you. None of the interviews should last more than one hour. During interviews, I will have some pre-arranged questions but will likely ask follow-up questions and give you an opportunity to address issues not covered in the questions. Of course, you may stop the interview at any point, or refuse to answer any questions. Formal interviews will be audio taped and transcribed. You have the option to review the transcript and make comments or corrections if you wish.

##### BENEFITS AND RISKS

Since you control the extent of your participation, answering only those questions you wish to answer, discussing only those issues you wish to discuss, the "risks" from participating in this project should be minimal. The benefits of the project will not be to you directly--aside from whatever pleasure you may take in sharing your opinions--but it is my hope that by studying the use of probeware technology in science teaching and learning others may benefit from the knowledge that we can share.

##### EXTENT OF ANONYMITY

Because observations, recordings, and interviews will deal in some detail with your activities in your classes, as well as with your workplace context, I will do everything in my power to maintain your anonymity. I will destroy or erase all tape recordings made as soon as they have been transcribed, and I will give you a pseudonym, but there is no way that anonymity can be guaranteed. Again, you should be aware that despite every effort to preserve it, anonymity may be compromised.

#### FREEDOM TO WITHDRAW

You can refuse to answer any question, and you may withdraw from this research at any time by simply telling the interviewer, or by contacting Dr. George Glasson at 540-231-8346 (or [glassong@vt.edu](mailto:glassong@vt.edu)), or getting in touch with Tom Hurd, the Chair of Virginia Tech's Institutional Review Board, at 540-231-5281. Agreeing to participate in one observation, taping, or interview does not commit you to participation in others.

Your signature below means that you have read this form and agree to its conditions. You will be offered a copy of this form.

Thank you for your consideration.

---

I would like to participate.

Researcher: Dennis Casey  
Department of Teaching and Learning  
Virginia Tech  
Blacksburg, VA  
24061-0313  
231-5847  
[dcasey@vt.edu](mailto:dcasey@vt.edu)

## Appendix H

### VIRGINIA POLYTECHNIC INSTITUTE AND STATE UNIVERSITY

#### Informed Assent for Students

Title of Project: Probeware Technology in the Culture of a Science Classroom

Investigator: Dennis Casey

#### Purpose:

Over the last three years, probeware technology has become prevalent in math and science classrooms of Virginia. The use of this technology is included in the Virginia Standards of Learning. As yet however, relatively little is known about how these instructional technologies fit into the culture of the science classroom. The main goals of this study are:

1. To portray what goes on in a science classroom where probeware technology is used.
2. To better understand how probeware is used as an instructional technology in teaching and learning science.
3. To offer alternative perspectives regarding the role of probeware technology in the context of science classrooms.

#### Procedures:

Primarily, I will be videotaping activities that take place in the classroom. In addition, I might like to look at lab reports you turn in or tests that you take. However, I will not use your name in any notes or documents I might write. I may ask you questions from time to time but the questions are aimed at my research and not connected with your classroom evaluation or grade.

#### Risks:

There should be no more than minimal risks to you from participating in this study. Your teacher will not have access to any taped material. You can refuse to be in any part of the study that makes you uncomfortable. You can also end your participation at any time.

#### Benefits:

There are no direct benefits to you but your participation in this research might help improve science teaching and better understand students' views on science and learning with technology.

#### Extent of Anonymity and Confidentiality:

When I transcribe video tapes, I will insert a pseudonym or code number in place of your name, and change other identifying information so that someone reading the transcript would probably not be able to connect it to you. Once the tapes have been transcribed and checked, they will be destroyed or erased. In any reports or articles I write using material from your interviews, I will use pseudonyms and make every effort to preserve your confidentiality. Despite my every effort to preserve it, however, anonymity may be compromised.

#### Freedom to Withdraw:

You are free to withdraw from participation in this study at any time. Just inform the investigator or call one of the others listed at the bottom of this page.

By signing below, you indicate that you have read and understood the informed consent and conditions of this project, that you have had all of your questions answered, and that you give your voluntary consent for participation in this project.

If you participate, you may withdraw at any time.

Thank you for your consideration.

---

Student signature Date

---

Parent signature Date

Researcher:  
Dennis Casey  
Department of Teaching and Learning  
Virginia Tech  
Blacksburg, VA  
24061-0313  
231-5847  
dcasey@vt.edu

Research Advisor:  
Dr. George Glasson  
231-8346  
glassong@vt.edu

Chair of Virginia Tech's Institutional Review Board:  
Tom Hurd  
231-5281

## Appendix I

Dr.  
Superintendent  
County Schools  
Street  
City, VA Zip

February 13, 2000

Dear Dr. ,

Allow me to introduce myself. My name is Dennis Casey and I worked for County Schools at William Byrd High School for 12 years in the position of earth science teacher.

In 1997 and 1998 I took a leave of absence to pursue graduate studies in the Department of Learning at Virginia Tech and last year I resigned so that I might get my Ph. D. degree in science education, curriculum and instruction.

I am writing to request your permission and support to conduct a research project for my dissertation in cooperation with County Schools. My research topic is a study of how computer and graphing calculator-based probeware technology is used in science teaching and learning.

I have talked to Ms. Carter about the idea and she made a few suggestions of teachers that are using the technology regularly but I have not contacted any of them yet. I foresee my field work taking place in one or two secondary science classrooms.

With your approval, I would like to talk to Ms. Carter again to make arrangements for selecting a final primary research site and a backup site in case it's needed. My research is designed to take place from now until May and I would be making regular visits (2-3 per week) to one classroom. Field data collection will consist of three parts:

1. Observations, audio and videotaping of classroom activities involving probeware technology
2. Interviews with the participating teacher and students regarding science and probeware technology
3. Examination and analysis of written documents such as lab reports and tests that were produced from using probeware technology

The teacher/participant will be selected based on suggestions from Ms. Carter and those agreeable to be involved. It is my intention to fully cooperate with the teacher/participant and to comply with his or her wishes if there should be a conflict. Further, it is my intention to fully cooperate with all School Board Policies (of which I am familiar) and school personnel.

The risks should be minimal (see attached Adult and Student Consent Forms) and protection of the rights, confidentiality, and anonymity of those involved will be of the highest priority.

As far as any beneficial effects, I plan to offer support to the participating teacher regarding the use of the technology (I am on this region's AEL team) and in discussing educational and pedagogical issues. Moreover, I hope my research will contribute in some way to science education and how technology is used in teaching and learning science.

If you would like to discuss my project further or have any questions or concerns, please contact me at 772-4318 (home) or my advisor, Dr. George Glasson (231-8346).

Thank you for your time and consideration and I look forward to hearing from you.

Sincerely,

Dennis Casey  
Department of Teaching and Learning  
225 War Memorial Hall  
Blacksburg, VA 24061-0313  
dcasey@vt.edu

#### Biographical Sketch

Dennis Casey is the sole investigator for this study. Mr. Casey taught high school science for twelve years in Roanoke County Schools. Mr. Casey is currently a Ph. D. candidate in curriculum and instruction at Virginia Tech. In his duties as graduate assistant and university mentor, Mr. Casey helps to train pre-service science teachers in the Science Education Program. Mr. Casey is a former president of the Virginia Association of Science Teachers and is currently serving as publications chair and webmaster. Mr. Casey is a member of the regional Appalachian Educational Laboratory training team and has led workshops on using technology in the classroom. Mr. Casey created and maintains web sites for the Science Education Program at Virginia Tech and for the Virginia Association of Science Teachers.  
(<http://www.tandl.vt.edu/acasey/casemain.htm>)

CC: Ms. Carter, Dr. George Glasson

Dennis Alan Casey  
Curriculum Vitae

Virginia Museum of Natural History  
1001 Douglas Avenue  
Martinsville, VA 24112  
276-666-8620

713 Windsor Lane  
Martinsville, VA 24112  
276-632-8306  
dcasey@vmnh.org

## EDUCATION

**Doctor of Philosophy**, Curriculum and Instruction, 2001, Virginia Tech, Blacksburg, Virginia

*Dissertation:* A Cultural Study of a Science Classroom and Graphing Calculator-based Technology

Research interests include: technology in science education, education for social justice, history and nature of science and technology, professional development, interdisciplinary education, and earth science education.

**Master of Arts in Education**, Curriculum and Instruction, 1998, Virginia Tech

**Bachelor of Science**, Science Education, 1985, Virginia Tech

## VIRGINIA TEACHING AND SUPERVISION ENDORSEMENTS

**Postgraduate Professional License**, effective July 1, 1998 to June 30, 2003. Endorsed in: Earth and Space Science and General Supervisor

## EMPLOYMENT

Director of Education at the Virginia Museum of Natural History, January 2001 - present. Main function is to interpret scientific research pertaining to natural history for statewide public and educational communities. Primary duties are to: develop, produce, and evaluate classroom education programs, teacher workshops, and other education programs; coordinate an annual science education teacher institute in support of the Science Standards of Learning; serve on exhibit development teams; supervise outreach educators; develop educational resource kits; provide outreach education and in-museum program development; conduct and participate in research pertaining to museum outreach programs; develop and maintain web-based documents pertaining to museum education and outreach.

Half-time Senior Research Associate and Education Coordinator for the Virginia Tech Museum of Natural History, Spring 2000 – January 2001. Primary duties included the coordination of educational and research resources and programs; supervision of staff; web site development; supporting relationships with local educational institutions; and,

assisting in planing and guidance of museum operations consistent with goals and mission.

Science Education Graduate Assistant and University Mentor at Virginia Tech, August 1997 - Spring 2000. Primary duties included mentoring student aides and student teachers on assignment and assisting in classroom instruction. Designed and maintained web sites for the Virginia Tech Science Education Program, The Geological and Biological Change and the Nature of Science Institute for Middle and High School Teachers, and The Southern African Studies Institute for Teachers.

Science and Technology Consultant for Eisenhower Regional Consortium for Mathematics and Science Education at Appalachian Educational Laboratory Virginia Regional Training Team VI, Spring 1998 – 2001.

Instructor of Elementary Science Methods Course at Virginia Tech, Spring 1998.

Earth Science Teacher, Roanoke County Schools, 1985 - 1997. County Science Fair Coordinator. Peer Mediation sponsor. Science Club sponsor. Student Assistance Program sponsor. In-school video production sponsor.

Part-time outdoor adventure instructor for Roanoke County Parks and Recreation, 1991 - 1995. Led groups on camping, caving, climbing, and canoeing trips.

Instructor in Roanoke County Summer and Evening Gifted Enrichment Program, 1987 - 1992. Classes for 6th-10th graders in oceanography and astronomy.

Youth Volunteer Coordinator and Educator for Science Museum of Western Virginia, 1986 - 1988.

## PROFESSIONAL ORGANIZATIONS

- Member of founding committee of Blue Ridge Association of Science Teachers. Served as treasurer for three years, vice president for one year, and president for one year.
- Past president of the Virginia Association of Science Teachers. Currently serving as publications committee chair. Began WWW site and currently webmaster.
- Member Virginia Science Education Leadership Association
- Member National Science Teachers Association
- Member Mid-Atlantic Association of Educators of Teachers of Science
- Member National Association for Research in Science Teaching

- Member American Educational Research Association

#### PROFESSIONAL ACTIVITIES

- Virginia Junior Academy of Science Project Reviewer and Judge, 2000
- College of Human Resources and Education Graduate Council, 1999-2000
- Excellence in Education Program Reviewer, 1999
- State Science Standards of Learning Assessment Committee, 1996 - 1999
- Matching Praxis II Subject Assessments to Virginia Licensure Regulations Committee, 1998
- Eisenhower Grant Reviewer, 1995-1996
- State Science Textbook Evaluation Committee and State Science Textbook Adoption Committee, 1994-1995
- State Science Standards of Learning Writing Committee, 1994

#### AWARDS AND HONORS

- Inducted Kappa Delta Pi, 2000. Elected graduate President Virginia Tech Chapter, February 9, 2000
- Virginia Association of Science Teachers Special Award for Outstanding Service to VAST and Virginia Science Education, 1999
- Inducted Omicron Delta Kappa, 1999
- Inducted Phi Kappa Phi, 1998
- Virginia Association of Science Teachers 1996 Earth Science Award for Outstanding Contributions to Science Education in Virginia, 1996
- Virginia Department of Education Math & Science Scholarship Recipient, 1983-1985

#### SELECTED PRESENTATIONS AND PAPERS

Casey, D., & Glasson, G. (2001, March). Graphing calculator-based technology in an “alternative” science classroom: An anthropological perspective. Paper presented at the annual meeting of the National Association for Research in Science Teaching, St. Louis, MO.

Glasson, G., Bentley, M., & Casey, D. (2000, March). Teaching evolution and the nature of science: Learning about contemporary scientific theories and research. Paper presented at the annual meeting of the National Association for Research in Science Teaching, New Orleans, LA.

Saurino, D., Bentley, M., Glasson, G., & Casey, D. (2000). Urban and rural students collaborate: Video teleconferencing technology in science teacher preparation. *Science Education International*, 11(3), 19-25.

Casey, D., & Wall, J. (1999, November). Middle school teaming with graphing calculator-based technologies. Presented at the annual meeting of the Virginia Association of Science Teachers Conference, Richmond, VA.

Casey, D. (1999, September). Graphing calculator-based technologies: Tools for interdisciplinary teaching. Poster session presented at the annual meeting of the Mid-Atlantic Association of Educators of Teachers of Science.

Glasson, G., Bentley, M., and Casey, D. (1999, September). Summer institute on evolution and the nature of science. Paper presented at the annual meeting of the Mid-Atlantic Association of Educators of Teachers of Science.

Bentley, M., Glasson, G., & Casey, D. (1999). Designing an inservice institute on teaching geological and biological change and the nature of science for middle and high school teachers. Presented at the annual meeting of the Virginia Academy of Sciences.

Saurino, D., Bentley, M., Glasson, G., & Casey, D. (1999, March). Preparing science teachers using distance learning: Urban and rural students collaborating using video teleconferencing technology. Paper presented at the annual meeting of the National Association for Research in Science Teaching, Boston, MA.

Bentley, M.L., Soares, D., Casey, D., & Hicks, D. (1999). Field studies as a context for student collaboration in preservice secondary teacher education. Presented at the First Annual Blue Ridge Symposium, Explore Park, Roanoke, VA.

Soares, D., Casey, D., & Hicks, D. (1998). Preservice teacher integration: Using Explore Park for integrating science, math, and social studies sols. Presented at the Team Building for Integration of High School Academics and Vocational Education Conference, Blacksburg, VA.

Casey, D. (1998, June). Exploring the TI-83 graphing calculator, cbl, and associated probeware. Leader at Montgomery County Secondary Science Summer Workshop.

Casey, D. (1997). Teacher professional growth and personal development. Keynote presentation at the annual National Teacher Training Institute Regional Conference.

Casey, D. (1995). Using the internet in the science classroom. Presented at Virginia High Schools That Work Conference, Roanoke, VA.

Casey, D. (1992, November). Chesapeake Bay Foundation programs: From the Virginia watershed to the bay islands. Presented at the annual meeting of the Virginia Association of Science Teachers Conference, Roanoke, VA.