DEVELOPING A NEW ENVIRONMENTAL SCIENCE PROGRAM
AT CLINTON COMMUNITY COLLEGE

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Subject Keywords: environmental science, ecology

Technique Keywords: grant writing

Pedagogy Keywords: new course/program, K-12 outreach

Overview: Ms. Padula wrote a grant to conduct workshops for in-service high school teachers, a proposal to develop an Environmental Science program at her institution, conducted a needs assessment for the Environmental Science program, and completely revised her Ecology course and incorporated some GLRC-ED lab and field techniques.

Introduction

The Great Lakes Research Consortium’s Ecosystem Dynamics program afforded me the opportunity to initiate development in our current science curriculum and programs. The following is a list of projects I worked on during the 1992-93 academic year.

- Four women scientists from the college and community and I wrote a grant that was submitted in January 1993 to the NYS Education Department. The program will offer a one week in-service workshop to area high school teachers. The proposal is titled “Clinton Community College Lake Champlain Basin Science and Technology Institute,” DDE Title UA Grant - In-service 1993-94. A copy of the grant is attached (Appendix 1).
- A proposal summary for the development of an Environmental Science Program at Clinton Community College was developed and presented to the President and Board of Trustees of the college. I was given the “go ahead” to do a needs assessment. We have been actively trying to obtain a building on historic Valcour Island as a field station. A copy of the proposal summary is attached (Appendix 2).
- The needs assessment for the Environmental Science Program is near completion. The community and area schools have responded favorably. Dr. Malcolm Fairweather, Chair of the Environmental Science Department at Plattsburgh State University, is anxious to work on articulation and is impressed with our efforts. Needs forms are attached (Appendix 3).
- Some course development and revision occurred as a result of my experiences at the GLRC-ED program. Ecology has been offered at CCC as a 3-credit course, generally for non-majors. We have revised the course to be a 4-credit lab course with prerequisites of Biology I and II. The course will focus on the Lake Champlain Basin and Adirondack Mountains as our laboratory resource. A 4-credit Physical Geology course also was developed and will be offered for the first time in spring 1994. In summer 1993, Organic Chemistry and Bio Chemistry, as well as an Environmental Analysis course, will be developed. Goals and objectives for Ecology are attached (Appendix 4).
- The New York State Two Year College Chemistry Teachers Association (NYSTYCCTA) annual spring conference was hosted by CCC. Our main topic focused on Environmental
Chemistry. We were fortunate to have Dr. Maria Pavlova, a national expert on toxicology, as our keynote speaker. Representatives from the US EPA and NY DEC were present. The program is attached (Appendix 5).

None of these efforts would have been possible without the experience of the GLRC-ED program that I attended in summer 1992. I would not have been able to focus on what our needs are and how to approach them. The opportunity to live with all of the participants in a very intensified program enhanced my professional development greatly. I thank you for allowing me the opportunity to participate. What the GLRC has helped start here at Clinton Community College will not terminate, but will develop into a unique educational opportunity for our students.
Appendix 1

CLINTON COMMUNITY COLLEGE
LAKE CHAMPLAIN BASIN
SCIENCE AND TECHNOLOGY INSTITUTE

DDE TITLE II A GRANT
INSERVICE TRAINING

1993-94
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A. PROJECT_ABSTRACT

Secondary science educators should seek to foster scientific literacy and critical thinking, prepare students for college and/or a career, and encourage awareness of the inter-relationships in the environment. To assist regional teachers in meeting these goals, Clinton Community College is seeking funds to present a unique learning opportunity for secondary science, math and technology teachers.

Situated on the shores of Lake Champlain, the College has access to an “outdoor laboratory”, the lake, which is also accessible to the local schools. We believe that using paradigms of science investigation which tap local resources can teach scientific principles which have wider application. We will involve teachers in a collaborative learning experience that will integrate environmental science, chemistry, geology, history, molecular biology, mathematics, computers and technological instrumentation in a one week practicum. Because of our commitment to writing and communication skills, we will integrate technical writing and reporting into our practicum. Additionally, our goal is to develop a network of professional personnel to provide support services including a scientific equipment lending library, expertise, and a method of sharing information.

The practicum will begin by taking the participants out on Lake Champlain in a research vessel equipped with state of the art scientific research equipment to collect plankton, fish and water samples and to study the limnological and chemical properties of the lake. During this session a Fisheries Biologist from the Department of Environmental Conservation (DEC) will present materials pertinent to the Lake Champlain Basin and inform the participants of current research being done in the lake. The afternoon session involves a field study of Valcour Island. The presenters will include a field biologist, an environmental geologist and a local historian. During the second day the participants will study water quality testing, pigment extraction techniques and concepts in chromatography and spectrophotometry. Presenters are a water quality chemist, a biochemist and an analytical chemist. Day three’s activities, designed to introduce the participants to current trends in molecular biology, will be presented by two Cornell University graduate students; techniques in polyacrylamide gel electrophoresis (PAGE) will be presented by two area high school biologists. The fourth day’s activities integrate computer graphing and
statistical inference of appropriate data collected during the practicum, with current trends in technical writing, and computer modeling of Lake Champlain. Presenters include professors of Physics, English, and Environmental Science. The last day of the practicum will be set aside for the participants to complete and present reports and evaluate the week’s experience.

The proposed practicum will incorporate a unique group of professionals from the area to provide a diverse and an academically enriched program. The specific exercises taught during the practicum, the lending library and the professional network - which will be outcomes of this project - will encourage participants to model this approach in their classrooms, thus enriching the educational opportunities of our area youth.
B. EQUITY/ACCESS INITIATIVES

The 20-year history of Clinton Community College shows an institution that serves traditionally underrepresented populations. We are deeply committed to meeting the needs of all students and residents of our community. This commitment is reflected in the College’s Mission, Equal Opportunity and Affirmative Action Statements, as well as in our policies and programs.

We have several programs which specifically serve the needs of underrepresented and underserved students; these include our College Entry Program (CEP), Inmate Higher Education Program (IHEP), CASSET and ACCESS programs. We offer many workshops and enrichment programs for local residents as part of a very successful continuing education program.

Lines of evidence to support the contention that under-represented populations participate in these programs come from the percentage of students on financial aid (85%), the percentage of older returning students in the student body (35%) and the percentage of minority students served (7.2%) as compared with the local demographics (4%).

The needs of our area’s gifted and talented students are met through our College High School Enrichment Program. Clinton Community College offers college credit-bearing courses in many area high schools, which give talented high school students an opportunity to start their college careers. To facilitate this effort, the College hosts regular high school-college meetings where high school officials, guidance counselors, college administrators and personnel share ideas, concerns and information.

In this proposed project, we aim to reach all secondary science and technology teachers in this area. The spin off from this is to reach all students in the area. Clinton Community College is continually looking for ways to enhance the quality of education at our College. This grant will be one more example of our progress. Since the major participants in the planning and execution of the grant are women, this too is a line of evidence that the access goal is being met, for one of the main topics in science literacy and science is more access to women. This access will be more fully met when more women role models are available for the aspiring woman scientist.

C. COOPERATIVE RELATIONSHIPS

This practicum is designed to integrate area educators and local professionals working in their fields in order to offer a diverse presentation to the participants. Area educators include two
local high school biologists, an Environmental Science professor from Plattsburgh State University, five Clinton Community College professors from varied disciplines, and a Fisheries professor from the University of Vermont. Local professionals include a Fisheries Biologist from the DEC, a geologist from the Adirondack Environmental Consulting Firm, a chemist from Plattsburgh Municipal Waste Water Treatment Facility, and a local historian. All will be involved with planning their presentation, delivering their materials, and evaluating the program.

John Haubner, the North Country Regional Coordinating Science Mentor, and Program Coordinator of Woodrow Wilson Institute, has endorsed our project and is willing to help us recruit for participants. Dave Beebie, Coordinating Mentor of the North Country Consortium of N.Y.S. Biology Teachers Mentor Network, has expressed great enthusiasm for the practicum and has offered his advise. Jeanne Hardy, Turnkey Trainer for Clinton-Essex-Warren County BOCES has shown her support of the practicum. Rita Calvo, Associate Director of Outreach Programs, Division of Biological Science, Cornell University, has also offered to send two graduate students to deliver a discussion of current trends in molecular biology and to assist the participants during the electrophoresis exercise. Letters from the above professionals and other letters of support have been placed in Appendix A.

D. PROGRAM MISSION, GOALS AND OBJECTIVES

Statement of Mission

Clinton Community College assumes responsibility for the improvement of the quality of life and is continually seeking to link its programs of study to the needs of individuals, businesses, organizations and the community. To fulfill this mission, a need for scientific literacy from an interdisciplinary focus utilizing local resources is necessary.

The College is in the planning stages of developing an Environmental Science program which will be the manifestation of the institutionalization of this project. With the emphasis on science in the 21st century and the location of the natural “outdoor laboratory”, Clinton Community College has the potential of becoming a leader among community colleges in the area of environmental science and technology.

Approximately 30% of the 885 majors in the Liberal Arts Curriculum at Clinton
Community College declare an intention to pursue education as a career. Most of these students continue their education at Plattsburgh State and remain in the area. Over the next five years this program would change its target population to integrate students, preservice and inservice teachers.

Primary Goals of the Program

We have three main goals that are to be addressed during this program. They are:

- To enhance scientific literacy in order to develop an appreciation for the inter-relationship between science, technology and our environment.
- To integrate the knowledge, skills and resources of area agencies, industries and the academic community into local schools curricula.
- To introduce area teachers to the tremendous scientific and historical resources that the Lake Champlain Basin has to offer.

In the week long practicum, each of these goals will be met by the active learning of the participants in each of the specific day’s activities.

Specific Objectives

There are six objectives that are an integral part of the program. Each participant completing the program will:

1. participate in a collaborative learning experience in a laboratory setting. Four groups of four participants each will be predetermined by the program coordinator. The four member teams will be comprised of teachers from different area schools, major disciplines, and grade levels to ensure heterogeneous grouping.

2. be able to teach two new scientific procedures, one in molecular biology and one in biochemistry, to the students at their home school and to integrate the material from these exercises to closely parallel the New York State Science curricula. Module 2 and Module 3 activities are designed as complete laboratory experiences with a teacher section and a student laboratory exercise section. A lending library will be available to the participants on a reserve basis containing all the necessary
equipment to repeat the exercises.

3. improve analytical skills. Each activity is designed to stress techniques in handling, storing, preparing and/or disposing of any chemical, instrument, supply or laboratory materials used. The introduction to various types of sampling equipment will also help improve analytical skills.

4. be able to report, graph and perform statistical interpretation of scientific data using a computer. Module 4 of the program is designed to provide a program for use in the high school science laboratory curriculum that is MacIntosh compatible. The appropriate data will be interpreted using this program and a copy will be given to each participant to take back to the home school.

5. be able to design a laboratory report using current philosophies in technical writing. Current techniques in report writing will be discussed and philosophies shared.

6. be able to utilize a network provided by Clinton Community College as support services including a lending library, scientific expertise and methods of sharing scientific information. As an outcome of this project, Clinton Community College will house this network and make it available to each participant. The network will be open for use as of September 1, 1993.

Each of the first five objective outcomes will be attained by the end of the practicum and appropriate assessment instruments have been designed to measure outcomes.

E. PROGRAM ACTIVITIES

The program of activities is divided into four modules; Lake Assessment, Biochemical Analysis, Molecular Biology and Computerized Data Analysis. The processes of thinking critically and writing and reporting clearly will be used to integrate these four components of the practicum as the participants apply the scientific method in problem solving. Each of these modules is being offered on a specific day. The daily activities for the week will run from 8:30 - 4:00.

Module I - Lake Assessment - July 5, 1993

The morning presenters will be Dave Nettles, a Fisheries Biologist from the DEC, and
Dick Furbush, a Fisheries Biologist and Boat Captain from the University of Vermont. The boat will be equipped with crew and state of the art sampling and netting instruments. Together they will lead the participants out on the lake where three different topics will be discussed.

The first topic will deal with limnology. They will discuss thermal stratification, and assist participants in taking water samples and measuring dissolved oxygen, pH, temperature and depth.

The second topic deals with aquatic invertebrates. The participants will take shoreline samples, discuss benthic invertebrates and gather plankton samples from plankton tow nets.

The third topic involves the discussion of fish species in Lake Champlain, the lamprey control program, sports fishing, and current research being done in the Basin. Each participant will receive a species identification chart and numerous pertinent publications from the DEC.

Local historian Dennis Lewis will give a presentation on the history of Lake Champlain and Valcour Island.

After lunch, we will begin a field trip of the island. The afternoon presenters will be Marcia Wolosz, an environmental geologist and Corinne Carey, a field biologist. There are many exemplary features of the island which include a Great Blue Heron Rookery, some of the better fossil beds in the basin, a variety of plant and animal species (even a moose) and many bird species. Some vegetation samples will be collected.

Module 2 - Biochemical Analysis - July 6, 1993

Water quality of samples collected on the first day will be assayed by E-coli count. The presenter, Sharon Lewis, a Water Quality Chemist, will discuss other aspects of water quality.

Judith Heintz and Janice Padula, both chemists, will instruct the exercise on pigment extraction of plankton at different depths and the vegetation from Valcour Island. Each team of four participants will be divided so that one pair will extract a plankton sample and the other pair will extract the vegetation sample. The samples will be extracted into solvent, filtered and then separated on a column. The eluant will be collected and stored for the afternoon’s analysis.

After lunch, the samples will be evaluated by thin layer and paper chromatography and by spectrophotometry. This exercise will be packaged for participants’ use at the home school.

Safety requirements, waste disposal, and Good Laboratory Practice (GLP) will be discussed prior to working in the laboratory.
Module 3 - Molecular Biology - July 7, 1993
Virginia Trombley and Sandra Latourelle, high school Biology Teachers, who will be assisted by two graduate students from Cornell University, will present current topics in molecular biology. The morning session will be spent preparing the fish muscle tissues for analysis. Each team will be divided into pairs to prepare tissues of several different species of fish. The ground and digested tissue samples will be stored in the refrigerator until analysis in the afternoon.

Following lunch the electrophoresis apparatus will be assembled, and samples run on PAGE gels. The stained gel will soak in water overnight for assessment and photography the next day.

(Appendix B)
Module 4 - Computer Analysis of Data, Report Writing and Computer Modeling - July 8, 1993

Al Cords, Physics professor, will present how computers are an integral part of the laboratory report process. Statistical inferences of data and graphic techniques will be presented using a MacIntosh compatible program. Each group will apply the statistical and graphing techniques to the collected data.

Jan Forman, English professor, will discuss current trends in technical writing, what is expected from an author by a scientific journal, and what report writing should include. Each group will write a report including graphics, statistical interpretations, results and conclusions using the computer.

After lunch, Lyn McIlroy, an Environmental Science professor, will present current techniques in computer modeling utilizing Lake Champlain data.

Each activity previously described encompasses critical thinking, problem solving, and mastery of techniques with an interrelationship and interdependence between all other activities. At the end of each day’s session an evaluation questionnaire will be administered and the agenda for the next day will be discussed.

Day 5 - Reporting Results and Evaluation - July 9, 1993
Time will be allotted for completing group reports. Each group will give a presentation of its report. In order to assess the attainment of goals and objectives, each participant will complete an evaluation instrument.

A copy of the week’s schedule is attached in Appendix C

F. RECRUITMENT

The summer program will be open to all Biology, Chemistry, Physics, Earth Science, Physical Science, Technology and Mathematics teachers of grades 7-12 living within a 100 mile radius of Clinton Community College (North Country region). Enrollment will be limited to sixteen inservice teachers. A four hundred dollar stipend will be given to each participant completing the program.

The applicant will provide a statement of purpose explaining reasons for program interest as well as anticipated ways the experience will benefit the secondary students. The applicant will send a resume along with a letter of recommendation from a colleague or school administrator. Each applicant must include a statement of intent attesting to the fact that he/she will be teaching for at least one year in the region following the program.

Recruitment will be regional. Brochures will be mailed to all area high schools, the program will be advertised through the North Country Teachers Resource Center (NCTRC), BOCES and Clinton Community College summer brochure and encouraged by John Haubner, Dave Beebie and Jeanne Hardy, Regional Science and Math Mentors for the North Country Region.

We will make every effort to stimulate interest in sciences, math and technology among women, African Americans, Latinos and indigenous groups who, for a variety of reasons and in many ways are under-represented and underserved. We will strongly encourage minority and women teachers and faculty members who teach science, mathematics or technology to under-represented groups of students to apply.

A selection panel consisting of the Academic Dean, the Associate Dean of Library Services, the Recruitment Officer of this program and the Project Director will choose the candidates according to the following criteria:
1. The group represents as many area schools as possible.
2. The selection is sensitive to the non-traditional groups represented in the sciences.
3. The statement of purpose is compatible with the goals and objectives set forth in the grant.

Application deadline: April 22, 1993.

G. EVALUATION

We designed our specific objectives to be congruent with measuring outcomes. We will evaluate our outcomes using the following six points:

1. Attendance and participation in the week’s activities will be recorded.
2. The last hour of each day will be devoted to the evaluation of the day’s activities.
   a. Discuss comments and concerns - these will be recorded.
   b. Administer daily evaluation. (Appendix D)
3. A laboratory report will be collected at the end of the week from each of the four teams.
   Each report will reflect the collective efforts of a four-member team.
4. A final evaluation of the week’s activities will be done on the last day of the program and will assess:
   a. Quality of instruction.
   b. Choice of materials.
   c. Content by discipline.
   d. Facility.
   e. Needs in future practicums.
   f. Other concerns or issues raised by the participants. (Appendix E)
5. A follow-up session is scheduled for January 1994. At that time, each participant is required to present, in writing, how their experiences from the practicum were incorporated into their curriculum.
6. Tabulation and interpretation of recruitment data, lending library use, and evaluation of cooperative relationships among schools, public agencies and industry will be processed into a final report.
H. PROJECT STAFFING AND MANAGEMENT

The Project Director/Principle Investigator and Co-Designer of this grant is Janice Padula, Division Coordinator, Math/Science Department at Clinton Community College. Janice will be acting as Program Coordinator responsible for overseeing all activities described in this grant, along with coordinating all personnel involved as presenters and participants. She will work closely with the Director of Recruitment/Public Relations Officer, Materials Coordinator/Materials Manager/Safety Officer, the Program Editor and the Science Consultant to assure the effective completion of project activities. She is a presenter of Module 2 and the Assessment and Evaluation Coordinator of this project. She will also administer the lending library and network.

Sandra Latourelle, in addition to her responsibilities as a presenter of Module 3, is a codesigner and the Director of Recruitment. This position will require the formation and dispersal of an application brochure. As part of the dispersal procedure, contacts will be made to several area science personnel and school administrators. Sandy will act as our Public Relations Officer, contacting area agencies and businesses in support of this program. She will assist in the administration of the lending library and in the assessment and evaluation of this program.

Virginia Trombley is a codesigner and the Materials Coordinator/Manager for this project. In this position, she is responsible for the coordination of materials and equipment for daily laboratory set-ups during the course of the program. She will coordinate the activities of the laboratory assistant for procurement, storage, prep and disposal of all laboratory materials. She is the safety officer and her responsibility is to ensure that all safety equipment is available, proper safety techniques are followed and that all participants are trained. She will also help develop the network and be involved with program assessment and evaluation.

Judith Heintz is a presenter in Module 2, co-editor and technical assistant for this project. Judy is the Scientific Information Resource Coordinator/Consultant, assuring that all information and activities are scientifically accurate. She will assist in the design of the network and the lending library. She will be involved with programs assessment and evaluation.

Corinne Carey is a presenter in Module 1 and a program assistant. Her responsibilities include program editing and time management. She will also be involved in the assessment and
evaluation of the program.

Dave Nettles, Dick Furbush, Dennis Lewis, Marcia Wolosz, and Corinne Carey are presenters in Module I.

Sharon Lewis, Judith Heintz and Janice Padula are presenters in Module 2.

Sandra Latourelle, Virginia Trombley and two graduate students from Cornell University are presenters of Module 3.

Al Cordes, Jan Forsman and Lyn McIlroy are presenters of Module 4.

Lisa Goznikar, Institutional Advancement Officer, and Jeff Dengler, Associate Dean for Administration, are responsible for the administration of the grant.

Resumes of all persons listed above are attached. (Appendix F)

A time line showing how the project will proceed if approval is granted is attached. (Appendix G)
MANAGEMENT STRUCTURE OF PROGRAM WITHIN CCC

Chief Executive Officer
Dr. Jay Fennell

Academic Dean
Fred Smith

Division Coordinator Math/Science
Project Director
Janice Padula

Recruitment
Sandra Latourelle

Material Management
Virginia Trombley
MONDAY - LAKE ASSESSMENT

8:30  Orientation and coffee

9:30  Presenters Dave Nettles and Dick Furbush Boat trip to Valcour Island

Limnology
- Thermal stratification
- Water sampling
- Dissolved oxygen

Aquatic Invertebrates
- Shoreline sampling
- Benthic invertebrates
- Plankton tows

Fish
- Slide show of some Lake Champlain species
- Discussion of lamprey control
- Impacts on improving Lake Champlain sportfishery

12:00  Presenter Dennis Lewis (Historical Consultant)
- Local history of the Lake Champlain Basin
- Bag lunch on Valcour Island at the site of the Battle of Valcour

1:00  Presenters Marcia Wolosz and Corinne Carey
- Overview of the geology of the Lake Champlain Basin
- Geology of Valcour Island
- Hike the island
- Collect vegetation for pigment extraction
- Species identification

3:00  Return to campus
- Coffee and reflect on the day
- Schedule and handouts for Tuesday

TUESDAY - BIOCHEMISTRY ANALYSIS

8:30  Orientation and coffee

9:00  Presenter — Sharon Lewis
- Prepare water for E-coli testing
- Water quality testing

10:00  Presenters Janice Padula and Judy Heintz
- Pigment extraction on plankton
- Pigment extraction on vegetation
12:00  Lunch

1:00  Presenters - Janice Padula and Judy Heintz
    - Theory of chromatography
    - Chromatography of pigments
    - Paper
    - Thin layer
    - Spect 20 analysis

3:30  Coffee and reflect on the day
    - Schedule and handouts for Wednesday

WEDNESDAY - MOLECULAR BIOLOGY

8:30  Orientation and coffee

9:00  Presenters Virginia Trombley, Sandy Latoureille and 2 graduate students from Cornell University
    - Current topics in molecular biology
    - Prepare fish for use
    - Digestion of fish tissue

12:00  Lunch

1:00  Run PAGE Electrophoresis
    - Develop overnight

3:30  Coffee and reflect on the day
    - Schedule and handouts for Thursday

THURSDAY - COMPUTER ANALYSIS OF DATA AND MODELING

8:30  Orientation and Coffee

9:00  Presenter Al Cordes
    - Graphing of data
    - Statistics on data

11:00  Presenter Jan Forsman
    - Current philosophies in scientific report writing

12:00  Lunch

1:00  Presenter
    - Computer modeling

2:30  Read results of electrophoresis

3:30  Coffee and reflect on the day
    - Requirements for Friday

FRIDAY

8:30  Coffee and debriefing
9:00 Groups will complete report writing on the computers.
10:00 Groups will discuss their results.
11:00 Groups will discuss how well the goals and objectives of the workshop were met, what went well, and what didn’t.
11:45 Evaluation
12:15 Lunch
It is our intent to develop an Environmental Science program for Clinton Community College. The dimensions of this program are vast, and can not be defined by merely listing the course offerings. There are four very definite goals that will be addressed during the development of this program. Each goal is described below.

**Goal 1: To offer an Environmental Science Program at Clinton Community College that leads to an Associates of Applied Science degree in one of three option areas: Biology, Chemistry, or Engineering.**

It is our purpose to interest young people to enter careers in science. Three options will allow students to choose their interests in a more specified area, each addressing issues concerning the Lake Champlain basin, the Adirondack Mountains, and global environmental affairs. During the first year, the students will follow virtually the same schedule. During the summer between the first and second years, all students will participate in a one-week practicum and a six-week in-service project. The second year will provide a more tailored curriculum in each option.

**Goal 2: To offer courses dealing with Environmental Science, Lake Champlain basin, and the Adirondack Park that are interdisciplinary and meet all criteria for general education courses.**

For example, a course taught by the Sociology department entitled “Environmental Issues” would be required for all Environmental Science majors as part of their general education requirement. Other courses that may be appropriate are:

- a) History of Lake Champlain
- b) Physical Geography of the Lake Champlain Basin
- c) Physical Geography of the Adirondack Mountains
- d) Social Ethics
- e) State and Local Government
- f) Government Agencies
- g) Economics

These courses and others will be available to all students at Clinton Community College and will provide local environmental awareness to many of our residents.

**Goal 3: To offer summer practicums in Environmental Science to area high school, junior high school, and elementary school teachers so they can become better informed about the Lake Champlain basin and the Adirondack Park. Additionally, practicums will provide the opportunity for field research and provide instruction on current lab techniques, which public school teachers can incorporate in their curricula and lesson plans.**

The practicums will provide a source of knowledge and laboratory experiences that can be easily
taken back to their classrooms. The sessions will run for a week and would focus on current research being done in the basin. One year later, a report will be submitted by each participant and a follow up session will be required to discuss how well the practicum experience was integrated into the classroom.

**Goal 4: To construct a field station on Lake Champlain equipped with the following:**

- a) a boat equipped for environmental research,
- b) a docking facility,
- c) classrooms for lectures,
- d) a small research laboratory,
- e) lodging facilities for ten people,
- f) a restroom, and
- g) a small kitchen.

The field station will provide an area from which to operate the practicums, classes, and field studies. The boat will be equipped with current scientific instrumentation for research and surveillance. The field station will also be available for guest lectures and expeditions to maximize the community’s understanding of the Lake Champlain basin.

If the proposal, as described in this summary, can be implemented in its entirety, Clinton Community College will be providing this area of the country with a unique and outstanding educational opportunity.

Please feel free to discuss this proposal summary with me, anytime. I look forward to your input and support.
Clinton Community College is studying the possibility of initiating an Environmental Science Program. Part of this initial study includes determining the consumer population in our region that would support the need for such a program. It is necessary to obtain data on the number of students who would be interested in attending or candidates for an Environmental Science Program.

Please answer the following questions:

1. In your best judgment, during the past three years approximately how many of your clients either attended or would have attended an Environmental Science Program?

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<thead>
<tr>
<th>Year</th>
<th>Actually Attended</th>
<th>Would Have Attended If Available In Area</th>
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<tbody>
<tr>
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<td></td>
<td></td>
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<tr>
<td>1990</td>
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<tr>
<td>1989</td>
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In your best judgment, what would you project as the number of your clients who would attend an Environmental Science Program given present availability of programs and if Clinton Community College had an Environmental Science Program?

<table>
<thead>
<tr>
<th>Year</th>
<th>Given Present Program Availability</th>
<th>If CCC Had An Environmental Science Program</th>
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<tbody>
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<td>1992</td>
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<td></td>
<td></td>
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<tr>
<td>1994</td>
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2. Do you expect any change in your agency services or client population which would impact on Environmental Science Program development? If so, please describe.

3. Do you see any needs which Clinton Community College could address as we design an
Environmental Science Program, e.g. specific coursework, internship possibilities, etc.? If so, please describe.

4. Do you support the need for an Environmental Science Program at Clinton Community College?
   _____ Yes _____ No

5. Additional comments.
Clinton Community College is studying the possibility of initiating an Environmental Science Program. Part of this initial study includes determining the consumer population in our region which would support the need for such a program. It is necessary to obtain data on the number of students who would be interested in attending or candidates for an Environmental Science Program.

Please answer the following questions:

1. In your best judgment, during the past three years approximately how many of your graduates either attended or would have attended an Environmental Science Program?

<table>
<thead>
<tr>
<th>Year</th>
<th>Actually Attended</th>
<th>Would Have Attended If Available In Area</th>
</tr>
</thead>
<tbody>
<tr>
<td>1992</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1991</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1990</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

In your best judgment, what would you project as the number of your high school graduates who would attend an Environmental Science Program given present availability of programs and if Clinton Community College had an Environmental Science Program?

<table>
<thead>
<tr>
<th>Year</th>
<th>Given Present Program Availability</th>
<th>If CCC Had An Environmental Science Program</th>
</tr>
</thead>
<tbody>
<tr>
<td>1993</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1994</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1995</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

2. Do you see any change in the career interests of your graduating students which would impact on Environmental Science Program development? If so, please describe.

3. Do you see any needs which Clinton Community College could address as we design an Environmental Science Program, e.g. specific coursework, internship possibilities, etc.? If so, please describe.
4. Do you support the need for an Environmental Science Program at Clinton Community College?
   _____ Yes _____ No

5. Additional comments.

Questionnaire completed by: ____________________________________________

   (NAME)

   __________________________
   (SCHOOL)

   __________________________
   (TELEPHONE)

Please feel free to call Janice Padula at 562-4192 to discuss any concerns.
In order to assess a need for graduates of an Environmental Science Program, please answer the following questions.

1) Please indicate the number of technicians (2 year degree) or Environmental Science graduates from 2 year institutions your agency has hired during the past three years. Specify approximate number hired each year.

<table>
<thead>
<tr>
<th></th>
<th>Full-Time</th>
<th>Part-Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>During 1990</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1991</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1992</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

2) How many technicians or Environmental Science graduates might you expect to hire in the next 3 years?

<table>
<thead>
<tr>
<th></th>
<th>Full-Time</th>
<th>Part-Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>During 1993</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1994</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1995</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

2) Do you expect any change in your facility or agency (expansion/reduction) which would impact employment opportunities for technicians or Environmental Science graduates? If yes, please describe.

3) Do you see any needs which Clinton Community College could address as we design an Environmental Science Program, e.g. specific coursework, internship possibilities, etc.? If so, please describe.

4) Do you support the need for an Environmental Science Program in Clinton County?
   _____ Yes _____ No

5) Fully aware of career mobility possibilities which exist in your agency, in your best judgment how many of your staff, on an annual basis, might enter an Environmental Science Program?
   __________
Appendix D

GOALS AND OBJECTIVES FOR BIO 206

TABLE OF CONTENTS

Table of Specifications 1
Goals and Objectives 2
Course Outline 6

TABLE OF SPECIFICATIONS

BIOLOGY 206 - ECOLOGY (4 CREDITS)

I. Introductory Concepts
   A. Terminology
   B. Natural Selection/Adaptation
   C. Ecosystems/Communities/Populations

II. Energy Flow
   A. Food Webs and Pyramids
   B. Niches and Limiting Factors
   C. Transformation of Energy by Plants
   D. Transformation of Energy by Animals
   E. Energetic Efficiency

III. Description of Populations
   A. Growth Curves
   B. Density Dependent Variables
   C. Density Independent Variables

IV. Population Dynamics
   A. Life Tables
   B. Predation, Dispersal, Extinction
   C. Reproductive Strategies
   D. Territoriality

V. Ecosystems
   A. Classification of Biomes
   B. Productivity
   C. Nutrient Cycling
   D. Soil Profiles
   E. Introduction to Limnology

VI. Communities and Inter-relations
   A. Ecological Succession
   B. Island Ecology
   C. Stability and Complexity
   D. Environmental Ethics
Goals and Objectives for BIO 206

I. Introductory Concepts
   A. To understand basic terminology essential to an introductory ecology course.  
      ex. Be able to describe or define an ecosystem.
   B. To understand how the process of natural selection determines which species will  
      exist within specific populations.  
      ex. Be able to describe how reproduction and survival define a population.
   C. To understand that species are organized into various groups and levels of hierarchy.  
      ex. Be able to place an animal into the appropriate ecosystem.

II. Energy Flow
   A. To understand how nutrients cycle through an ecosystem.  
      ex. Be able to diagram a food chain for an example animal.
   B. To understand how different variables can limit a population.  
      ex. Be able to explain why larger animals need bigger home ranges.
   C. To understand how plants utilize sunlight for all their energy needs.  
      ex. Be able to define tree layering and shade tolerance.
   D. To understand how animals ultimately utilize sunlight for all their energy needs.  
      ex. Be able to define herbivores and primary and secondary carnivores.
   E. To understand the efficiency of various animal species in utilizing energy.  
      ex. Be able to define Allen’s Rule.

III. Descriptions of Populations
   A. To understand that animal populations are regulated by many variables.  
      ex. Be able to explain a sigmoid growth curve.
   B. To understand that some populations are controlled by density dependent variables.  
      ex. Be able to list several density dependent variables that affect populations.
   C. To understand that some populations are controlled by density independent variables.  
      ex. Be able to list several density independent variables that affect populations.

IV. Population Dynamics
   A. To understand the importance of life tables to define changes in a population over  
      time.  
      ex. Be able to define fecundity, fertility, natality and mortality.
B. To understand how factors such as predation, and dispersal can affect predatory-prey relationships. ex. Be able to describe a model of predation, such as the lions and wildebeest of the Serengeti.

C. To understand that different animal populations use different reproductive strategies to survive. ex. Be able to differentiate between r-selected and k-selected species.

D. To understand the social factors such as territoriality can affect populations dramatically. ex. Be able to describe territoriality in different species such as the red-winged blackbird.

V. Ecosystems

A. To understand the term “biome.” ex. Be able to classify different parts of North America into distinct biomes.

B. To understand that biomes differ in productivity. ex. Be able to explain why the tundra is so unproductive.

C. To understand the similarities and differences in nutrient cycles in the various biomes. ex. Be able to describe the experiments on nutrient cycling performed at Hubbard Brook.

D. To understand that various biomes have different soil profiles. ex. Be able to define the A Horizon, B Horizon, and C Horizon as they apply to soil profiles.

E. To understand some introductory concepts that apply to lake ecosystems. ex. Be able to tell how lakes can be formed.

VI. Communities and Inter-relations

A. To understand how succession builds an ecosystem over time. ex. Be able to observe a forest and determine which stage of succession it is in.

B. To understand the significance of islands. ex. Be able to list several unique characteristics that apply to animals that live on islands.

C. To understand “Why are there so many different kinds of plants and animals?” ex. Be able to describe how diversity can lead to stability.

D. To understand that we have the responsibility to preserve our environment, and encourage environmental ethics. ex. Be able to understand the loss incurred with the extinction of a species.
I. Introductory Concepts
   A. Terminology
      1. Ecology
   B. Natural Selection/Adaptation
      1. Fitness vs. Abundance
   C. Ecosystems/Communities/Populations
      1. Species Relationships

II. Energy Flow
   A. Food Webs and Pyramids
      1. Food Chains
      2. Food Webs
      3. Eltonian Pyramid
      4. Trophic Levels vs. Animal Size
   B. Niches and Limiting Factors
      1. Definitions of Niches
      2. Law of the Minimum
      3. Saturation
      4. Sigmoid Response Curve
      5. Limits by Temperature
   C. Transformation of Energy by Plants
      1. Energy Flux
      2. Lindeman Efficiency
      3. Photosynthetic Efficiencies
   D. Transformation of Energy by Animals
      1. Energy Transfer Along Food Chains
      2. Lindeman Efficiencies
      3. Assimilation
   E. Energetic Efficiency
      1. Physiological Ecology
         a. Allen’s Rule
         b. Bergman’s Rule
      2. Heat Budgets

III. Description of Populations
   A. Growth Curves
      1. Competition
      2. Logistic Equation
   B. Density Dependent Variables
      1. Crowding and Invasion
      2. Winter Mortality
C. Density Independent Variables
   1. Predation

IV. Population Dynamics
   A. Life Tables
      1. Terminology
      2. Survivorship
      3. Management Implications
   B. Predation, Dispersal, Extinction
      1. Models of Predation
      2. Dispersal vs. Patchiness
      3. Local Extinctions
   C. Reproductive Strategies
      1. Opportunistic Species
      2. r- vs. k- Selection
   D. Territoriality
      1. Defending Home Ranges
      2. Polygynous Species
      3. Living in Groups

V. Ecosystems
   A. Classification of Biomes
      1. Tundra
      2. Forests
         a. Coniferous
         b. Temperate
         c. Tropical
      3. Savanna
      4. Deserts
   B. Productivity
      1. Ocean Productivity
      2. Animal Productivity
   C. Nutrient Cycling
      1. Budgets in Forests
         a. Hubbard Brook Forest
      2. Cycles in Other Biomes
   D. Soil Profiles
      1. Primary Classification
   E. Introduction to Limnology
      1. Origin of Lakes
      2. Thermal Strata
      3. Lake Champlain
VI. Communities and Inter-relations

A. Ecological Succession
   1. Terminology
   2. Forest Seral Stages

B. Island Ecology
   1. Natural
   2. Human Influenced Islands

C. Stability and Complexity
   1. Diversity and Species Richness
   2. Diversity Consequences

D. Environmental Ethics
   1. Endangered Species
   2. Pollution
   3. Resource Management
   4. Human Populations
   5. Sustainable Environment

Appendix 5
NYSTYCTA
Spring 1993
Conference
Lake Placid Manor
Lake Placid, NY

Accommodation Information
Lake Placid Manor

Rates
Standard $99/night, Deluxe $125/night.

Additional person $35/night.

Rates include meals, breakfast, complimentary hors d'oeuvres at the cocktail hour, and use of the conference facility and gratuities.

To reserve, please call the Lake Placid Manor at (518) 523-2573.

For special needs, please call the Hilton Inn, Lake Placid at (518) 561-5731 (home phone).

Clinton Community College
RR#3 Box 8A
Plattsburgh, NY 12901-9573

(518) 562-4200
Contact person: Janice Pacula
(518) 561-3731

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New York State Two Year Colleges
Chemistry Teachers Association

Spring 1993 Conference, March 26 - 27

The conference will be held at the Lake Placid Manor, a quaint Adirondack hotel
on Lake Placid. The main topics of this conference are Environmental Chemistry
and Issues in Chemistry Technology. The agenda is as follows:

March 26
3:00 - 3:30 Registration at Lake Placid Manor
3:30 - 4:00 Welcome and Introductions
4:00 - 5:00 Round table discussion, Issues and Problems
6:00 - 7:00 Cocktail hour (Dutch treat)
7:00 Dinner and keynote speaker
Maria Pavlova, PhD, National Expert on Toxicology
and Medical Officer - EPA "Environmental/Chemical Issues
for Teachers and Programs in Education"

March 27
7:30 - 8:30 Breakfast
8:30 - 9:30 NYSTYCCCTA meeting
9:30 - 10:45 Panel presentations & discussion: Technology
in the Chem Lab* Peter Bittle, NCCC - "Distance Learning"
Janice Padula, CCC - "Lake Champlain Basin Science
& Technology Institute Summer Practicum"
Dennis Swanger, UCC - "Computerized Laboratory Experiments"
10:45 - 11:00 Break
11:00 - Noon Speaker: Tom Monroe, Region 5 Director of DEC
"Environmental Issues in the Lake Champlain Basin"
Noon Lunch

Fill out and mail this form with a $20 conference registration fee (per person) to:
Janice Padula, Clinton Community College, RR3 Box 8A, Plattsburgh, New York
12901-9573.

Name ________________________________
Address ________________________________
Telephone (Day/Evening) ________________________________
Are you currently a NYSTYCCCTA member? __yes __no
Will you be making reservations at the Lake Placid Manor? __yes __no
Do you need special arrangements or will you only be staying for a portion
of the conference? Please explain. ________________________________

College Affiliation ________________________________