

# Natural Resources and Environmental Issues

---

Volume 7 *University Education in Natural Resources*

Article 25

---

1998

## Student authoring, editing and electronic publishing

Aaron N. Moen

*Department of Natural Resources, Cornell University, Ithaca, NY*

Spencer R. Hall

*Department of Natural Resources, Cornell University Biological Station, Bridgeport, NY*

Thomas N. Moen

*Institute of Water Research, Michigan State University, East Lansing, MI*

Follow this and additional works at: <https://digitalcommons.usu.edu/nrei>

---

### Recommended Citation

Moen, Aaron N.; Hall, Spencer R.; and Moen, Thomas N. (1998) "Student authoring, editing and electronic publishing," *Natural Resources and Environmental Issues: Vol. 7* , Article 25.

Available at: <https://digitalcommons.usu.edu/nrei/vol7/iss1/25>

This Article is brought to you for free and open access by the Journals at DigitalCommons@USU. It has been accepted for inclusion in Natural Resources and Environmental Issues by an authorized administrator of DigitalCommons@USU. For more information, please contact [digitalcommons@usu.edu](mailto:digitalcommons@usu.edu).



---

## STUDENT AUTHORIZING, EDITING AND ELECTRONIC PUBLISHING

Aaron N. Moen<sup>1</sup>, Spencer R. Hall<sup>2</sup>, and Thomas N. Moen<sup>3</sup>

<sup>1</sup>Professor of Wildlife Ecology, Department of Natural Resources,  
Fernow Hall, Cornell University, Ithaca, NY 14853

<sup>2</sup>Department of Natural Resources, Cornell University Biological Field Station,  
Shackelton Point Rd, Bridgeport, NY 13030

<sup>3</sup>Institute of Water Research, Michigan State University,  
East Lansing, MI 48823

**ABSTRACT:** Millions of term papers have been written by college seniors who will be writing reports and publications as part of their professional responsibilities soon after graduation. While most term papers are graded and returned to student authors, a former student shared the observation that “nothing less than an ‘A’ is acceptable on the job.” Writing assignments can be made more meaningful by giving student authors responsibility for their writing similar to those professionals have; their work will be edited, read and used by others. Student papers were first published on the Department’s Cooperative Learning Center (CLC) local area network in 1991, after development of the Educators Software Package (ESP) for preparing hypertext information systems. Since then, over 2000 files have been published by CLC students in several courses. An immediate improvement in the quality of writing is observed when students know that the criterion for excellence is “acceptable for publication,” and their papers will be read by students for years to come. Editorial guidelines remind students that disciplined scientific writing is different from creative writing. Student editorial boards monitor the progress of successive drafts, and data document improvement in writing as a result of the comments of student editors. The student-authored information systems, complimented by professionally-authored files, are accessed through course, subject, and species menus. Search functions enable students to find information on our CLC network that others have written, and links to libraries and the World-Wide Web provide access to other publications. While the information on our CLC network is of significant value to the students, the greater long-term value lies in the development of professional responsibilities for writing and editing. Rather than writing a term paper and taking what they get for a grade, our students write and rewrite until their paper is accepted for publication. Student editors, graduate assistants, and course professors help the students reach that goal, and when it is reached, everyone benefits, including students in the future.

### INTRODUCTION

Millions of term papers have been assigned by professors, written by college students, read and graded by their professor or a teaching assistant, and then returned to the student author. Many of these students will be writing reports and publications for their job supervisors as part of their professional responsibilities soon after graduation. While it is customary to return term papers to the student authors with a grade in the range of “A to F,” a former student commented that, on the job, “nothing less than an ‘A’ is acceptable.”

Professors can make writing assignments more meaningful by giving student authors responsibility for their writing similar to those of professionals; their work will be edited, read and used by others. Professional-level writing should be the goal of all students when they are both learning to write and writing to learn. Writing should be an “authentic and natural activity” (Plevine 1982).

Professors need to be patient with student authors; success should be measured in long-term cumulative benefits rather than in immediate success or failure (Etheridge 1995). Professional researchers edit each others work before it is accepted for publication, and authors must follow a journal’s publishing guidelines. Thus scientific writing should be thought of as a life-long learning experience by students and professionals alike.

This paper describes student authoring and editing in the Cooperative Learning Center (CLC) in the Department of Natural Resources at Cornell University, and the organization of the electronic information systems for student publishing on the local area network in the CLC. Student papers were first published on the CLC network in 1991 after T.N. Moen developed hypertext information system software called the Educators Software Package (ESP). Since then, over 2000 files have been published on our CLC network by students in several wildlife-related courses. S.R. Hall, the senior editor spring term 1997, has quantified and graphed the number of editorial comments on successive drafts.

He has also asked several former student authors and editors to share the effects of authoring, editing, and publishing on their writing skills, interactions with peers and professors, and their perceived implications for their future professional careers.

### STUDENT AUTHORING

It is interesting to consider the number of hours college students invest in writing term papers relative to the number of hours readers invest in reading them. The reading audience is likely to be limited to a professor or a teaching assistant. One might estimate that writing and editing a term paper takes at least one hour per page, and reading about two minutes. The primary outcome of the reading is likely to be the grade, and the secondary outcome is the knowledge gained by the student. We suggest that knowledge gained and shared should be the primary outcome, and the grade secondary.

Students seem willing to take their chances when writing traditional term papers, deciding when a paper is done and accepting the grade assigned. In our setting, we have observed an immediate improvement in the quality of writing when students know that publication is the goal. Students realize that they are writing for "real audiences," an idea that warranted an entire issue of the Connecticut English Journal 15 years ago (Shugert 1983).

Writing should result in new knowledge acquired by the author; and sharing the written material with others multiplies the benefits of the author's efforts. While the grade should be secondary, its importance is not minimized. Rather, writing for real audiences makes the grade even more important because content that will be shared will be held to professional-level writing standards. We believe that our student authoring, editing, and publishing system promotes editorial improvements until student papers are acceptable for publication at a professional writing level. If they are not, what guarantee do we have that the first paper a new graduate writes in a new job will be professional-level writing?

Knowing that papers will be read by students for years to come is an important motivating factor for student authors. Improvement is immediate, and the cooperative learning environment in the CLC provides support and encouragement. We also benefit from having a course continuum in wildlife ecology and management (Table 1), which is a vertical integration of freshmen through graduate students in teams that work together toward common goals, similar to the vertical integration of career professionals where veterans and new employees are expected to work together (Fazzari and Moen 1996). Learning groups of 4-6 students are formed where students work together in goal-setting and project planning to meet team goals while individuals assume responsibility for their own research and writing. The student authoring and

editing process in this interactive learning environment begins with project selection.

### Project Selection

Undergraduate teaching assistants and senior management students help the students identify ideas for research projects, with the help of Professor Moen and graduate students. Students review published information resources on our CLC network and access the library databases for publications in journals and books. A final project idea is then submitted to undergraduate teaching assistants for approval.

Table 1. Students in the Wildlife Ecology and Management Course Continuum at Cornell University enroll in concept and application courses, and then work together in learning groups with students from each course.

---

NTRES 104 Natural History Information Management Concepts (1 credit)
NTRES 105 Natural History Information Management Applications (1-9 credits)
NTRES 105-1 Natural History of Plants
NTRES 105-2 Natural History of Animals
NTRES 105-3 Decision Aids for Laboratory and Field Identification
NTRES 204 Natural Resources Modeling Concepts (1 credit)
NTRES 205 Natural Resources Modeling Applications (1-9 credits)
NTRES 205-1 Biophysical Modeling in Natural Resources
NTRES 205-2 Simulation Modeling in Natural Resources
NTRES 205-3 Population Modeling in Natural Resources
NTRES 304 Wildlife Ecology Concepts (1 credit)
NTRES 305 Wildlife Ecology Applications (1-9 credits)
NTRES 305-1 Wildlife Behavior
NTRES 305-2 Wildlife Physiology
NTRES 305-3 Wildlife Nutrition
NTRES 305-4 Wildlife Energetics
NTRES 404 Wildlife Populations Ecology Concepts (1 credit)
NTRES 405 Wildlife Populations Ecology Applications (1-9 credits)
NTRES 405-1 Wildlife Population Estimating Techniques
NTRES 405-2 Wildlife Population Simulation Models
NTRES 405-3 Wildlife Population Reconstruction Models
NTRES 410 Wildlife Management Concepts and Applications (3 credits)
NTRES 498 Teaching in Natural Resources (1-3 credits)

---

### Research Proposals

After selecting a project, a research proposal is prepared following guidelines in the Written and Oral Communications Information System (Moen 1998). Guidelines are given for writing titles, hypotheses, and objectives, and suggestions are given for describing methods, equipment, and data analyses. Proposals are written by each student and shared with the other students in the learning group before being submitted to undergraduate teaching assistants for editorial comments and approval. After the proposal is approved, students do library, laboratory, and field research, coordinating work within the learning group as they focus on a theme while demonstrating

relationships among natural history, organismal biology, ecology, and management concepts.

#### Publication

Each of the students in a learning group writes at least one manuscript to be submitted for publication in information system on our CLC network, including review papers based on library research and original research in the laboratory and field. Students are encouraged to outline their manuscript drafts before they begin writing, using the outlining option in word processing software. This concept is introduced to students in the Natural History Information Management course in the continuum (Table 1), and students in other courses in the CLC (Moen *et al.* 1996) who have not had the information management course learn about outlining software with the help of other students. Students then write their manuscripts and share them within the learning group. After responding to comments and suggestions of their peers, student authors submit their manuscripts to the student editorial board as the first step toward publication on the CLC network. The editorial procedures which follow are discussed next.

#### STUDENT EDITING

Traditional term papers have been a valuable part of higher education for a long time, even if they have only been read and graded rather than edited and improved. Now, however, students can work together more closely to bring term papers up to higher professional standards because of changes in student attitudes toward peer editing and revision that are directly related to the use of word processing software (Wright 1988). In our experience, students almost always respond positively to peer editing.

The idea for peer authoring and editing is not new. Reviews of collaborative learning by Gaillet (1992a, 1992b) indicate that peer editing in the classroom was promoted by Professor George Jardine at the University of Glasgow in the period 1774-1826. Recent publications promote authoring and peer editing as part of English composition classrooms (e.g. Dale 1997), but we suggest that it is especially logical for students to author and edit in science courses, because sharing research results through publications is standard procedure in the sciences.

When student authors know that other students will edit their writing for both style and content, they will consider and usually incorporate the editorial suggestions of the student editors, and discuss questions of content with them. Student editors may even have a better understanding of content than professors have. For example, Professor Moen, the senior author of this paper, completed a plant physiology course in 1964. A student who completes a plant physiology course fall term 1997 will likely be able to help a student who is writing on that subject spring term 1998 more than Professor Moen

can. Because ecology is broad and complex, professors are setting a good example when they call on the knowledge of their students when evaluating student writing.

Teachers usually find a number of mistakes in student writing and it is often difficult to write helpful, perceptive comments on student papers (Grant and Shapiro 1987). Grant and Shapiro point out how teachers must decide what roles to play in their comments, such as coach, judge, or doctor. In order to help students become their own best readers, they also suggest that teachers should respond to student drafts in the way they respond to their colleagues' drafts—few judgments and directives, more questions and suggestions. We try to have students in the CLC approach editing in that professional way because it helps prepare them for professional careers where writing and editing will likely be expected of them.

While the student-authored information resources on our CLC Network are of significant value to current students, the greater long-term value lies in the development of professional attitudes toward writing and editing. Rather than writing a term paper and taking what they get for a grade, our students write and rewrite until their paper is acceptable for publication. Further, editing the writing of others helps students improve their own writing. Students become conscious of criteria and guidelines, and are reminded that disciplined scientific writing is different from creative writing. Interactions with a student editorial board help student authors improve their writing because, as one student pointed out "...it provided a step-by-step approach to reviewing my work and gave me a sense of cooperation from the editors with whom I worked." In a learning environment that permits intellectual flexibility and demands independent time management, another student noted that the editorial guidelines "...gave me structure when writing a scientific paper. The guidelines really helped give me a good idea how to set it up."

One of the advantages of student editing is that students tend to appreciate and to support each other's writing efforts. They tend to trust their peers (Pianko and Radzik 1980) and recognize common problems. The editing process in the CLC learning environment promotes cooperation with little perceived competition for grades assigned to papers among authors. Grades of "A" are not a limited resource; students earn that grade when their paper is acceptable for publication, our goal for all of the students in the CLC. As a result, one student felt that, "...other students gave more honest and helpful suggestions and edits, unlike other classes where peer editing was actually mired with competition."

#### Student Editorial Boards

Editing is a learned skill, and student editors need guidance when learning to be effective peer editors. Editorial guidelines are available in the Written and Oral Communications Information System (Moen 1998). We also hold an editing workshop at the beginning of the term to identify common

problems encountered in student writing and to call attention to the more unique ones that can be expected. The student editors learn things as simple as standard edit marks and as complex as the design of scientific papers. Edit marks can be made available with little discussion, while design considerations should be discussed in editing workshops. The student editors learn about professional journal guidelines (we use the *Journal of Wildlife Management* as our guide) and go over editorial comments on manuscripts that have been submitted for publication by professional scientists.

The student editors hold authoring and editing workshops for their learning groups early in the semester, calling attention to the importance of following editorial guidelines and the most common mistakes students make in this disciplined publishing setting. By identifying common writing problems, such as paragraph contents that do not build on the topic sentence, paragraphs that do not flow together, and captions that do not contain sufficient information, attention is focused on specifics that can be corrected early in the writing process. Such attention to detail carries over into the rest of their writing.

All of the undergraduate teaching assistants in the CLC are part of the student editorial board, and are responsible for both copy editing and content editing. While peer editors in the learning group should be sure that formatting guidelines have been followed, a student editor evaluates a submission for correct formatting first. If the guidelines have not been followed, the manuscript is returned to the student author. Manuscripts that are properly formatted are sent to student editors chosen for their knowledge of the subject for content editing, just as referees are chosen by professional journal editors.

Student editors monitor the progress of submissions, and provide feedback to student authors by E-mail and by returning written comments on the manuscript to students in their CLC mailboxes. When a student editor considers a manuscript ready for publication, it is submitted to Professor Moen with a recommendation for acceptance. Typically, student editors in the CLC review a manuscript two or three times before approving it. In this non-traditional environment that depends so much on the student editorial board, one student commented "...students fulfilled their editorial responsibilities very well."

#### Quantifying Student Improvement

Improvement in student-authored papers has been quantified by counting the number of editorial comments on successive drafts of 6 papers spring term 1997. Editorial comments were counted in three categories: copy, style, and content comments (Table 2).

Table 2. Examples of copy, style, and content editorial comments.

Copy	Style	Content
Spelling errors	Redundant statements	Factual incorrectness
Typographical errors	Awkward Statements	Information lacking
Spacing and formatting errors	More explanation needed	Illogical arguments
Words missing	Poor topic sentence, or none at all	Ecological significance not clear
Grammatical mistakes	Poor paragraph structure	Statistical analyses inappropriate
Punctuation errors	Poor word choice or phrasing	Captions not informative
Citation needed		
Incorrect table and figure references		

The number of editorial comments declined with successive drafts as authors incorporated the suggestions of student editors; there were about half as many comments on the second draft as there had been on the first draft (Figure 1). The numbers of editorial comments related to copy, style, and content categories are shown in Figure 2. Note that student editors identified copy editing problems more often than style or content problems, with improvements in all three editing categories as manuscripts were revised up to six times.

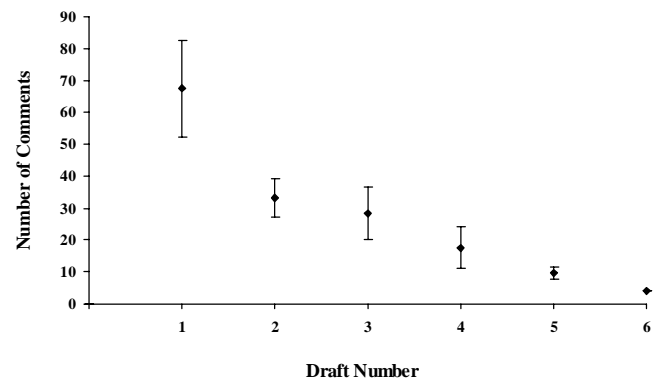


Figure 1. Average number of editorial comments made ( $\pm 1$  SE) by student editors and Professor Moen on 6 successive drafts of papers approved for publication during the 1997 spring term.

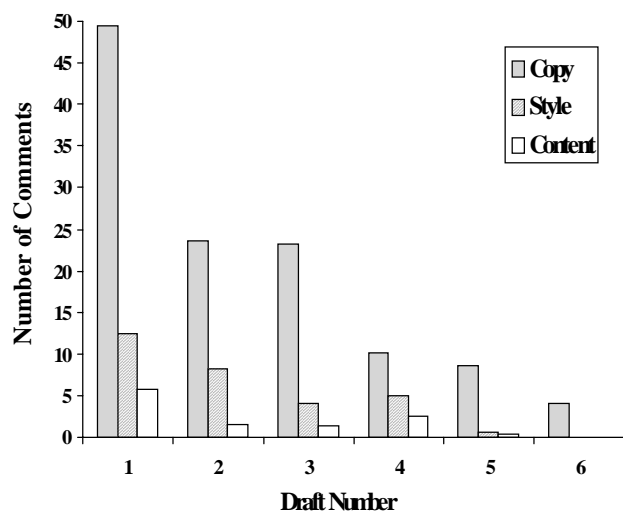


Figure 2. Number of copy, style, and content editorial comments ( $\pm 1$  SE) by student editors and Professor Moen on 6 successive drafts of papers approved for publication during the 1997 spring term.

As student editors reviewed papers, the number of comments made declined because authors incorporated the comments and papers improved. However, on submission to Professor Moen, the Editor-in-Chief in the CLC, the number of comments increased again (Figure 3). The distribution of the number of comments made is bimodal; student editors identified many errors and professional-level editing identified several more that student editors had overlooked. Particular improvements were noted in topic sentences, making sentences clearer, using simpler words, and clarifying ideas.

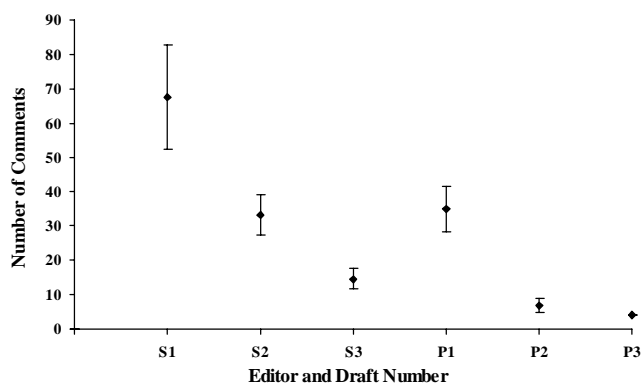


Figure 3. Number of editorial comments ( $\pm 1$  SE) on drafts reviewed by student editors (“S” + draft number) and Professor Moen (“P” + draft number) on the 6 successive drafts. The number increased (P1) when Professor Moen edited the student papers because he suggested editorial changes that student editors had overlooked.

Ideally, student editors would reduce the number of copy editing comments that a faculty editor would have to make. Even though Professor Moen still found a number of copy editing problems after students had edited two or more drafts, the edited drafts were much better than the first draft of a typical term paper.

#### Challenges in the Editing Process

A new approach to writing in a rather different learning environment presents challenges to student authors. A range of prior research and writing experience should be expected when a group of new students assembles, and there is a range of writing abilities to draw on among student editors. It is important for professors to remember that students are learning how to write, learning how to edit, and learning how to read each others work critically. A range of student experience with research and writing should be considered normal in every class, with variations from year to year. Recognizing that, it is logical to provide new students not only with the technical help they need but with writing and editing models to follow. Writing models should include examples of professional writing and editing, perhaps from their professor’s own experiences. Editing models should include the professor’s editing of sample pages written by student editors in a “revision workshop.”

One major challenge in the editing process is the amount of time that editing and rewriting requires; the time commitment by student authors and editors can be substantial for a 5-page paper. One student stated that “Time was a main issue. Authoring and especially editing took a lot of time in my schedule,” and another said “The time it took for completion of my papers seemed like forever. I couldn’t just finish....” For students with already challenging workloads, the time commitment to prepare a paper for publication could be overwhelming at times. One student compared writing traditional term papers with CLC papers: “Typically, other classes involve no editing. You write the paper, make some minor revisions, and turn it in. In the CLC I rewrote my paper more times than any other in my entire life. Each rewrite taught me something different, though, which made the whole process a valuable experience.”

The need to establish personal timelines for project completion accompanies the time spent rewriting papers. One student said “The most challenging aspects of the process was being able to set my own deadlines rather than being told specific due dates.” Another student commented “Since the class

has a more unstructured atmosphere, it took more discipline.” The intellectual freedom granted to student authors can cause frustration at times; one student pointed out that “it is a lot easier to be told what to do than to have to think through the process and decide which is the best way to do it.”

The regular student-student and student-teaching assistant interactions in the CLC result in an increased potential for conflict among students compared to traditional lecture and term paper settings. One student described the most challenging aspect of authoring and editing as “...rethinking and reworking parts of a paper I thought were good when comments indicated a need for improvement.” Feelings can be hurt when one’s writing is challenged, because words are a personal expression of an idea. Most students are not accustomed to receiving formal editorial criticisms from their peers and may not be prepared to deal with negative comments from them. This is part of the total learning experience, however; both authors and editors need to learn how to interact professionally.

Students who are new to this approach are encouraged when working with more experienced students who are enthusiastic about peer editing. Student-student interactions are one of the key factors for success in college (Astin 1992), and care should be taken that unskilled or uncommitted students are not grouped together (O’Donnell 1980). Matching more qualified students with less qualified ones can be good strategy if the more qualified ones serve as good models and help improve the qualifications of their coeditors. Everyone benefits from grouping students with varying qualifications: authors learn more about subject matter as they write and how to write better when they receive editing help, and editors learn about both subject matter and editing as they help other students.

Since student authors and editors have varying levels of writing and technical abilities, differences in editorial comments from different student editors are expected. These differences can confuse student authors accustomed to receiving inputs from one graduate teaching assistant or one professor. Our students commented...“Some teaching assistants have differing opinions, resulting in a lack of continuity in the editing” and “there were large differences in how people edited the papers.” One student said “I noticed that if I did not have the right student editor look at my paper, I didn’t get good feedback.”

Student authors are convinced that the authoring, editing, and publishing process results in a superior finished product. Intensive peer editing “helps us learn from our mistakes” and “the quality of writing increases with each revision.” Students shared additional comments such as “I think it is a great idea to get students used to the kind of writing we did...it feels really good to get something published...the teaching staff was always helpful, ready to listen, and really interested in what I was doing...I definitely have a better grasp of communicating my words and thoughts.” The final student-ed-

ited manuscript has much more value to the author, editors, and other students than much longer traditional term papers do; we conclude that the time invested is well worth it. After reading dozens of papers that have been improved by having student authors and editors work together leads the senior author of this paper to conclude that most students are good writers. Complaints about their writing should be directed at the process rather than the product.

## ELECTRONIC PUBLISHING

One of the most compelling reasons for promoting student authoring and editing is the potential to increase dialogue among students using hypertext-based information systems. Collaboration in writing should not be confined to authorship and peer editing, but should include dialogue with readers as well (Hunt 1992). Knowledge acquired by both students and teachers should be shared, and hypertext links make that feasible. Making meaningful information connections within classes and among successive years of student publishing by using hypertext links is so new that professors and students are still learning how to use it effectively.

### Electronic Information System Design

Publishing on electronic information systems is different from publishing on paper. Files in an electronic information system need to be written with guidelines that assure uniformity among files. Page formats should be pleasing to see and easy to read. File length should be limited to a few screens, since broad subjects can be divided and divisions linked wherever related contents should be connected.

Files in the information systems on the CLC network are expected to contain appropriate multimedia components, with the text supplemented by graphs, tables, images, audio and video clips, and executable models (Boomer and Moen 1996, Runge and Moen 1996). Each of these additions to the main text or “alpha” file enhances the educational value of the file by engaging readers in more active involvement with the file subject. Electronic publishing involves much more than writing a traditional term paper.

### Information System Menus

Each information system has a menu. New information systems are created with the ESP software by using a menu as the initial file. The software finds not only the files listed on the menu, but all other files linked to these menu files before compiling the information system. Sample menus from some of the information systems on the CLC network are found in Tables 3-5. These sample menus are very abbreviated as indicated by the ellipses (...) after most menu entries, and many of the files are accessed from a number of different menus.

Course-related menus. Course-related menus are based on course titles and numbers. Course menus are accessed by students at the beginning of a term in order to learn more about the course, plans for the semester, names of teaching assistants, and other pertinent course information.

Table 3. The course-related menu on the CLC Network.

---

NTRES 104	Natural History Information Management Concepts
NTRES 105	Natural History Information Management Applications...
NTRES 204	Natural Resources Modeling Concepts
NTRES 205	Natural Resources Modeling Applications...
NTRES 304	Wildlife Ecology Concepts
NTRES 305	Wildlife Ecology Applications...
NTRES 404	Wildlife Populations Ecology Concepts
NTRES 405	Wildlife Populations Ecology Applications...
NTRES 410	Wildlife Management Concepts and Applications...
NTRES 498	Teaching in Natural Resources...

---

Subject-related menus. Subject-related menus list typical subject areas such as anatomy, behavior, nutrition, physiology, etc. The entries do not represent specific courses in these subject areas, but identify all of the files on the CLC network that pertain to these broad subject areas.

Table 4. Abbreviated subject-related menu on the CLC Network

---

Anatomy and morphology...
Behavioral ecology...
Biometeorology...
Natural History...
Nutritional ecology...
Physiological ecology
The concept of biological time
Baseline metabolism
Body temperature rhythms, white-tailed deer
Chemical composition of milk, moose
Chemical composition of milk, white-tailed deer
Physiological thermoregulation
The concept of homeothermy
The thermal energy environment
The concept of critical thermal environment
Population ecology...

---

Species-related menus. Species-related menus provide students access to all of the published files on the CLC network that pertain to a particular species. Species menus are used by students in the Natural History Information Management course early in the semester when they are reviewing published information on different species and selecting a species

of interest to them as the subject of a natural history file. Students in the modeling, ecology, and management courses do research and publish on selected aspects of species ecology and management.

Table 5. Abbreviated species-related menu on the CLC Network.

---

<i>Canidae</i>
Natural history, gray fox ( <i>Urocyon cinereoargenteus</i> )...
Natural history, coyote ( <i>Canis latrans</i> )...
<i>Cervidae</i>
Natural history, white-tailed deer ( <i>Odocoileus virginianus</i> )
Body composition, white-tailed deer
Body temperature rhythms, white-tailed deer
Food habits, white-tailed deer
Heart rate responses of white-tailed deer to snowmobiles
Milk production, white-tailed deer
Weight rhythms, white-tailed deer

---

#### Using the Cooperative Learning Center Network

New students begin using the CLC Network immediately, accessing student-authored information first. This impresses on them the importance of previous student's work and of their own work in their first term. We discuss appropriate file subjects and file length, describe the concept of hypertext and information relationships, and introduce the Written and Oral Communication Information System (Moen 1998) where they find suggestions, guidelines, ideas, templates, and more. They also access libraries and the World-Wide Web, learn how to search effectively, and how to select relevant information from the large amount available.

Students in any one of the courses in our course continuum (see Table 1) have access to the concepts from all of the courses in the continuum. Students in the course on natural history information management, for example, are expected to access the modeling, species ecology, population ecology, and management course concepts, giving them a broad picture of wildlife ecology and management as well as a larger context for their own work.

#### Using the World-Wide Web

The World-Wide Web (WWW), with its powerful searches and hypertext capabilities, has added a whole new meaning to the term "information delivery" in higher education. In the past, large amounts of information were delivered by lecture because it was an efficient way for professors to summarize the results of many hours of library work and years of education for their students. Lectures are still effective, but the role of lectures has changed. Now, lectures can focus more on



concepts that should be discussed rather than on information delivery, since the more straightforward facts can be delivered electronically. Professors can deliver course information electronically that was delivered by lecture in the past, and well-written professional files serve as models for students to follow.

The computers in the CLC are linked to the libraries at Cornell and to the WWW. How important is it for college professors to help students learn how to review not only traditional publications but also information resources on the WWW? An elementary school in Minnesota uses the Internet as a collaborative tool, an information resource, and a medium for student publishing because it is imperative that educators use the WWW (Collins and Collins 1996). Students in a rural elementary school in Ohio have published over 1,500 original books and poems since 1990 (Massey 1995). Current elementary school students using WWW resources and publishing will expect to use such up-to-date resources and creative learning activities in college.

#### Expanding Publishing Opportunities for Students

The potential for expanding student and faculty publishing opportunities is almost beyond imagination. Students in wildlife ecology and management at Cornell have been publishing on our local area network since 1991. Now we are developing a CLC Web Page that will be the access point to these publications spring term, 1998. Students enrolled in the wildlife ecology and management continuum courses will be able to access Professor Moen's Main Concept Book and other files from any computer.

The potential for global distribution of student and faculty writing will inevitably bring changes to higher education. Information is equally accessible to professors and students, and the line between student and teacher is less marked now than ever before. Perelman (1992) applies the term hyperlearning to "...a wide-open community of practice, where learning is by doing..." and "...the roles of apprentice and expert are continually shifting with the demands of the problem at hand..." The lines between universities, geographical locations, programs... are all fading. Imagine the potential for cooperation among Universities at the program level, and for cooperation of students and faculty working on similar research problems. The vision for a "community of learners" described by Perelman (1992) may be realized sooner than we think. College students should not be considered empty vessels to be filled, but colleagues on a quest for knowledge in a setting that relies much more on lateral transfer than on vertical transmission of knowledge.

#### CONCLUDING REMARKS

Students enjoy writing and learning in any subject more when they are given encouragement and support. Recognizing the

value of student-authored work by publishing on a local area network promotes interest and a feeling of accomplishment among students. In the Cooperative Learning Center at Cornell University, we are learning how to promote cooperation and collaboration among students, and how to design an authoring and editing environment that will be challenging and rewarding to students. We are convinced that will, not wealth (Perelman 1992) is the key to success in this endeavor (Moen and Decker 1996).

Knowing that students will read what other students have written, both professors and students need to be more conscious of correct content. Fewer pages with correct content are better than more pages with questionable content. Shorter files connected by hypertext to related files are better than longer ones that stand alone. Writing assignments should be shorter if quality and the amount of learning is inversely proportional to length.

An important feature of a learning group in the CLC is its vertical integration . . . freshmen through graduate students learn together, and each person makes significant contributions to the group, demonstrating the true characteristic of "hyperlearning" (Perelman 1992) as they share their ideas and expertise. In order to do this effectively, each student must assume responsibility for his or her own learning because no professor, or even a large number of graduate teaching assistants, can or should watch over the students to see that they "do their work." A student who graduated two years ago wrote: "Although it can sometimes be difficult to work as a member of a team, it is commonplace in the professional world. There, projects and ideas are often undertaken by members of a team and if not, they are certainly under scrutiny by co-workers and employers."

Student learning, not teaching, is the focus in the Cooperative Learning Center in the Department of Natural Resources at Cornell University. Student authors, student editors, student readers, graduate assistants, and professors are all part of an education team that should strive to make the transition from student to professional as complete as possible, and life-long learning a reality. When we follow the guideline that what we do in our Cooperative Learning Center must be authentic relative to professional work, we are confident that our attempts are on track, and any failures we experience are due to our own inexperience and the impossibility of being the perfect teacher for every student.

#### ACKNOWLEDGMENTS

G. Scott Boomer, Jennie Braden, Alyssa Hassan, Elizabeth Hill, Dawn Ladanyi, Wendy Mahaney, Tim Negley, Danielle Ogurcak, Jessica Saletel, Claudia Sandoval, Wesley Savage, and Christine Vatovec contributed comments on their experiences as student authors and provided helpful comments as

we prepared this manuscript. Financial support from The American Wildlife Research Foundation, the Department of Natural Resources, and the Electronic Technology Committee in the College of Agriculture and Life Sciences at Cornell University for the local area network in the Cooperative Learning Center is gratefully acknowledged.

#### LITERATURE CITED

- Astin, Alexander W. 1992 or 93. *What Matters in College?* Jossey-Bass Publishers, San Francisco. 482 pp.
- Boomer, G. Scott and Aaron N. Moen. 1996. Bringing students into the loop: modeling wildlife ecology and management concepts and applications. Pages 27-33 *IN: Proceedings, First Biennial Conference on University Education in Natural Resources. The Pennsylvania State University, University Park, PA. 261 pp.*
- Collins, Christine and Stephen Collins. 1996. The internet as a tool. *IN: Call of the North, NECC '96. Proceedings of the 17<sup>th</sup> Annual National Educational Computing Conference, Minneapolis, MN.*
- Dale, Helen. 1997. Co-authoring in the classroom: creating an environment for effective collaboration. *National Council of Teachers of English, Urbana, IL. 115 pp.*
- Etheridge, Chuck. 1995. What's wrong is what's right: setting realistic expectations for peer evaluation. *English in Texas 27(1):4-7.*
- Fazzari, Jennifer L. and Aaron N. Moen. 1996. Cooperative learning in natural resources classrooms and courses. Pages 7-15 *IN: Proceedings, First Biennial Conference on University Education in Natural Resources. The Pennsylvania State University, University Park, PA. 261 pp.*
- Gaillet, Lynee Lewis. 1992a. An historical perspective on collaborative learning. *Journal of Advanced Composition 14(1):93-110.*
- Gaillet, Lynee Lewis. 1992b. A foreshadowing of modern theories and practices of collaborative learning: the work of Scottish rhetorician George Jardine. Paper presented at the Annual Meeting of the Conference on College Composition and Communication, Cincinnati, OH. 20 pp.
- Grant-Davie Keith and Nancy Shapiro. 1987. Curing the nervous tick: reader-based response to student writing. Paper presented at the Annual Meeting of the Conference on College Composition and Communication, Atlanta, GA. 16 pp.
- Hunt, Russell A. 1992. Utterance in the classroom: dialogic motives for invention. Paper presented at the Annual Meeting of the Conference on College Composition and Communication, Cincinnati, OH. 10 pp.
- Massey, Cheryl A. 1995. Student publishing: a writing program that works. *Principal 74(3):36-38.*
- Moen, Aaron N. 1998. *Written and Oral Communications. Electronic Information System, Cooperative Learning Center, Department of Natural Resources, Cornell University, Ithaca, NY.*
- Moen, Aaron N. and Daniel J. Decker. 1996. The net cost of education innovation: more for less. Pages 16-26 *IN: Proceedings, First Biennial Conference on University Education in Natural Resources. The Pennsylvania State University, University Park, PA. 261 pp.*
- Moen, Aaron N. Charles R. Smith, Charles Krueger, and Barbara Bedford. 1996. Integrating courses: making the commitment and transition. Pages 181-189 *IN: Proceedings, First Biennial Conference on University Education in Natural Resources. The Pennsylvania State University, University Park, PA. 261 pp.*
- O'Donnell, Cathy. 1980. Peer editing: a way to improve writing. Paper presented at the combined Annual Meeting of the Secondary School English Conference and the Conference on English Education, Omaha, NE. 7 pp.
- Perelman, Lewis J. 1992. *School's Out: Hyperlearning, the new technology, and the end of education. William Morrow and Company, New York. 368 pp.*
- Pianko, Sharon and Abraham Radzik. 1980. The student editing method. *Theory Into Practice 19(3):220-224.*
- Plevine, Arlene. 1982. The basic comp class as rhetorical situation. Paper presented at the 33<sup>rd</sup> Annual Meeting of the Conference on College Composition and Communication, San Francisco, CA. 22 pp.
- Runge, Michael C. and Aaron N. Moen. 1996. No more black boxes: programming and modeling in wildlife ecology and management courses. Pages 227-232 *IN: Proceedings, First Biennial Conference on University Education in Natural Resources. The Pennsylvania State University, University Park, PA. 261 pp.*
- Shugert, Diane P. (Editor). 1983. *Writing for real audiences. National Council of Teachers of English, Urbana, IL. 113 pp.*
- Wright, Anne. 1988. Teaching writing while jumping through new technological hoops. *English Journal 77(7):33-38.*