Integration in a Forest Management Curriculum
by
David K. Lewis

Abstract
The Forestry Faculty at Oklahoma State University has offered a problem solving class since 1979 to provide a learning experience that requires the integration of the Forest Management curriculum. The course objectives are achieved by the students forming themselves into teams and selecting a problem offered by a 'real' client. The student teams develop responses to the questions posed by the client problems and report these responses to their client.

INTRODUCTION
In 1979 the Forestry Faculty at Oklahoma State University first offered an experience designed to integrate student learning as part of the Forest Management curriculum. The course adopted the pattern of a problems course offered at Iowa State University. Currently, this course is designed for the last spring semester of a student's undergraduate program of instruction.

The intent of the Faculty is to provide an integrated problem solving experience that will allow students to apply biological, quantitative, economic, political, and administrative principles in forest resource management.

COURSE OBJECTIVES
The Forestry Faculty have identified the following objectives for their problem solving course:

Provide students with the opportunity to synthesize, through selection and application, the forest resource management principles learned in their course of study.

Provide students with an opportunity to experience the implications of professional ethics in the practice of forestry.

Enhance student confidence in their forest management skills and develop their understanding of what it means to be a professional resource manager prior to graduation.

COURSE OUTLINE
To achieve these objectives students form into teams; select a problem with a client, and with the client define the questions deserving a response. At the end of the term students present their response to the questions; and make an oral and written presentation to the client. The course structure requires students to develop a solution for a 'real' natural resource problem, with a 'real' client. Lectures are limited to enhance the problem solving experience.

Problems
The key to a learning experience of this type is the problem the students address and the attitude of their client. Each problem in the course includes the need to collect data from the forest or other natural resource system. This data must be subject to some form of analysis to develop the information necessary to respond to the questions posed by the problem objectives. The interest of the client and the importance of the problem, to the client, are considered in addition to problem characteristics. A major element of the success of this experience is in the relationship between the students, the client, and need of the client for a response to the questions posed by the problem.

Teams
A second important element of this experience is the formation and function of student teams. Student teams, not individuals, are responsible for selecting the problem to be addressed and reporting results of the team's effort to the client. The Forestry Faculty feel that this is an important part of the learning experience. For most of our students, this is the work environment they will find themselves in after graduation. Teams allow students the experience of small group dynamics and the experience of team work in the context of long term problem solving. Group dynamics include the responsibilities of leadership and subordinate participation in the context of task planning and execution to achieve common goals. The structure of student teams requires instruction, in the

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1 Associate Professor, Forestry and Adjunct Associate Professor, Agricultural Economics, Oklahoma State University, Department of Forestry, 008 Ag Hall Rm. C, Stillwater, OK 74078-6013.
form of coaching, of individuals and teams as the students work through their problems.

**Project objectives**
The process of defining a project objective is the third element of the problem solving experience. The Forestry Faculty identified this process as a key element of the student experience.

The definition of objectives occurs in two phases. The first involves the identification of specific questions for which a response is necessary, followed by the definition of project objectives. The formation of specific questions deserving a response is a responsibility of the student teams working with their client. A characteristic of this phase is the lack of clarity that most clients have about their problem.

Once questions are identified, student teams develop specific achievable objectives for their projects. These objectives and their achievement are the basis for the response of the project teams to the problem posed by their client. The role of the instructor in this phase is to lead the thinking of the student team through the use of leading questions and providing an emphasis on professional responsibilities.

**Response**
The completion of project objectives and presentation of a response to the questions posed by the client problem are the final element of this learning experience. The teaching element of this phase involves a review of the report outline for content and organization, and constructive criticism of the oral presentation. In both of these activities the course instructor uses other members of the Forestry Faculty as well as other members of the University community to provide an integrated, multidisciplinary review. Other students provide additional instruction through class discussions.

The use of other members of the Forestry Faculty and University community is an important element of this course. Student teams are encouraged to use other members of the University community as consultants in the development and interpretation of their project activities. The consultants provide guidance and counsel to the student teams and participate in the review and criticism of student work. In the 19 years the course has been offered, consultants have come from all of the University’s colleges, and members of the University community have never refused to function as consultants.

**ASSIGNMENTS**
In order to facilitate these elements of the learning experience, students, both individually and as a team, complete a number of assignments.

**Resume**
The first of these assignments is the preparation of a resume. This assignment is scheduled for completion during a laboratory that is part of the first class meeting. The purpose of the resume is to assist in the formation of student teams and to support the job search activities of the students. The teaching emphasis is on the realities of resumes, their function, some of the mechanics of their application, and the importance of accomplishments as opposed to experience. A part of the laboratory experience includes the importance of time management in the completion of assignments.

**Problem presentation**
Early in the course, after meeting with their client, the student teams make a presentation to the class and Forestry Faculty of their problem and how they propose to go about its solution. This has the purpose of stimulating student activity on defining the problem and identifying elements of a solution. It also serves to inform other members of the class what other teams are doing, promoting collective discussion and problem solving in the development of project plans. A final element of this assignment is the students' experience in making an oral presentation to a group.

The teaching emphasis in this assignment is constructive criticism of individual and team presentations. Questions and suggestions on the defined problem and proposed solutions are also a major teaching emphasis.

**Project plan**
One week after oral presentations, student teams turn in a project plan. The required elements of this plan are: a clear statement of the problem; a well-defined objective, including measurable outcomes with a defined date of completion; a complete array of tasks necessary to achieve objectives, a reasonable schedule for completion of tasks; identification of necessary resources; and assigned responsibilities. The purpose of the plan is to aid students in the successful completion of their projects. Teaching activities in this assignment involve review of proposed plans and suggestions, usually in the form of leading questions, to aid students in the development of a complete and workable plan. This assignment always takes at least one iteration to develop a satisfactory plan.
Progress reports
Each month during the term student teams turn in a progress report of their activities. In these reports, progress is measured against the tasks and schedule defined in the team's project plan. This assignment serves a number of purposes. The first is to encourage student progress toward meeting the objectives of their project. A second purpose is to reduce instructor anxiety and identify if there is a need for intervention. Finally, the progress report provides the students with the realistic experience of reporting their progress against standards of performance.

Report outline
Six weeks before the end of the term, student teams prepare and turn in a detailed outline of their written report. Outlines are reviewed by the instructor and each of the consultants that students have used in the course of their project. The accumulated review comments are presented to the student teams one week after they have submitted their outline. This is the only formal contribution by faculty to the written report prior to its presentation to the client. The intent of this design is to limit the faculty contributions so that the report remains the responsibility of the students and reflects their professional effort.

The primary purpose of the assignment is to allow counseling and coaching on the completeness and content of the project reports. A secondary, but important, purpose is to force students to complete most of the information collection and analysis by this time. This allows a reasonable length of time for preparation of final reports and oral presentations.

The instructional focus of this assignment is on the presentation, both orally and in writing. The role of the instructor is to provide review comments that improve the clarity of the report and focus the discussion of results on the objectives of the project.

Presentation to class
During the penultimate week of the term each student team presents their project report to the class, Forestry Faculty, and consultants. This serves as a dress rehearsal for oral client presentations, and contributes to learning through the sharing of student experiences.

The instructional focus in this assignment is the discussion and commentary that follow each presentation. These discussions involve students as well as faculty and consultants.

Presentation to client
During the last week of the term each student team makes a presentation to their client. The time and place of these presentations are at the convenience of the client. Clients are encouraged to involve relevant decision makers and others interested in the project. The instructor is present at these meetings as an observer. The arrangements and conduct of presentations and discussions that follow are under the direction of the students. It is their show. There is not an instructional element to this assignment beyond the evaluation process. However, there is a substantial learning experience for the students associated with standing up and presenting the results of their work to one or more decision makers. In the final analysis, the experience is meant to reward students for the work they have done.

STUDENT EVALUATION
Student evaluations are based on four elements that are combined to derive a grade for the course. The elements include:

Team evaluation by the client - 20 percent of the grade
Team evaluation by the instructor - 40 percent of the grade
Individual evaluation by peers - 20 percent of the grade
Individual evaluation by instructor - 20 percent of the grade

The evaluation of the team's effort by the client consists of two parts. The first is a numerical scoring of how well the team did in carrying out the project they had agreed upon with the client. The standard for this is the client's expectation for an entry level professional forester. The second element is a written review of the team's work. This usually includes both positive comments as well as opportunities for improvement. Client comments are shared with the students as part of a written review by the instructor.

The basis for the instructor's team evaluation is the performance of the team on all aspects of their project. The final written and oral reports carry the greatest weight in this element of the evaluation. The evaluation recognizes the difficulties of each project, the energy, enthusiasm, and imagination that each team applied to their project. The standards for performance are the performance goals for the forestry curriculum identified by the Forestry Faculty.

The basis for individual evaluations, by peers, involves the distribution of 20 points among the other
members of the team based on their contribution to the
team effort and success. The distribution of 20 points
among individual team members requires the students
to discriminate among the contributions of their peers.

During the 19 years the course has been
offered, the Faculty has observed no abuse of the
peer evaluation in the grading process.

The basis for evaluation of individuals, by the
instructor, are observations of individual students
during the course, performance of assigned tasks
identified in the project plan, and oral presentations.
The standard for individual evaluations is the same as
the team evaluation, the performance goals defined by
the Faculty. However, individual evaluations
recognize difficulties students may have with particular elements of the performance standard.
These generally involve special difficulties involving
oral communication.

The final element of the evaluation is a
written assessment of team and individual performance
by the instructor. The written assessment also includes
the team evaluation by the client. The assessment
recognizes superior performance as well as suggestions
for improvement.

INTEGRATION OF MANAGEMENT AND
ECONOMICS
Economic and management science are integrated into
the student’s learning experience in most of the
projects through the development of land use or forest
management plans. These plans have to deal with the
selection and specification of silvicultural treatments
that will create and future forest condition consistent
with the goals and budgetary constraints identified by
the client.

Most of the projects completed by students in
the past have been for clients with small ownerships so
that forest regulation has not been an issue. However,
there have been some notable exceptions where student
projects involved properties that were large enough to
include traditional concerns with the scheduling of
operations beyond those imposed by budgetary
constraints.

Student projects have also included problems
that included a major economic or financial
component. These projects have generally taken the
form of feasibility analyses.

SUMMARY
In summary, 19 years ago the Forestry Faculty at
Oklahoma State University decided to offer a problems
course to integrate the learning experience for their
Forest Management curriculum. Currently this course
has the objectives of providing students with
opportunities to synthesize the forest management
principles learned in their curriculum, and to
experience the implications of professional ethics in
the practice of forestry. In the process of achieving
these objectives students also gain confidence in forest
management skills and develop an understanding of
what it means to be a professional forester.

In 1992 this course was reviewed by the
College of Agricultural Sciences and Natural
Resources and the General Education Council of the
University as part of a Campus wide effort to define
capstone experiences for all curricula. This review led
to approval, by the College and the University General
Education Council, of this course as the capstone
course for the Forestry Curriculum.

An important consideration, in the approval
process, is the role this course plays in encouraging
graduates from the forestry curriculum to have a
breadth of vision and a broad perspective of the
practice of professional forestry. A second important
consideration is the role of this experience in
developing student understanding of the place of
professional forestry in the larger world of knowledge
and the role of knowledge in satisfying the needs of
individuals and societies.