

An Integrated Approach to Enhance Critical Thinking Skills in a Landscape Construction Course



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Abstract

Recent research shows landscape installation is a fast growing and profitable segment of the horticulture industry. To meet this growing demand, the industry needs employees who have a skill set that integrates technical knowledge, practical application and creative problem solving. A landscape construction course that incorporates a variety of student-centered teaching methods including case studies, a small group project, and role playing exercises, was created to help students further their problem solving, decision making and critical thinking skills. By incorporating principles from Bloom's Taxonomy in the course, students moved from lower order to higher order thinking skills within a given exercise and across the topics taught during the semester.

Introduction

The landscape management segment of the horticulture industry continues to grow. In 2001 approximately 140,000 businesses in the United States reported providing landscaping services, and these companies employed more than 700,000 people (University of Georgia BOS/SBDC, 2001). The 2003 State of the Industry Report revealed 75% of 374 respondents expect to have more work in 2004 compared to 2003 (Landscape Management, 2003). Additionally, 25% of the respondents identified that landscape installation was the most profitable, and fastest growing, segment of their business. When asked about their biggest management challenges, the largest response (21%) was a concern about labor availability, followed by the ability to manage growth (18%) and concern about the ability to develop and train employees into supervisors and foremen (17%) (Landscape Management, 2003).

With the industry's growth in mind, it is important for colleges and universities to provide well-educated and trained students to fill this industry need. Henry et al. (2004) noted challenges associated with teaching landscape construction at a university, such as difficulty in finding academically trained professionals who also have practical work experience, the reality that a number of different approaches and materials can be used to complete a given

project, and the materials expense associated with this type of class. Creating a landscape construction course appropriate for a four-year undergraduate program requires integration of technical knowledge, practical application and large-scale problem solving skills. Helping students develop a comprehensive skill set, including problem solving and critical thinking abilities, is essential to their future employment success. The purpose of this article is to describe three student-centered learning activities that were added to a course which was originally lecture centered. The author previously taught this landscape construction course at Oregon State University and is currently teaching it at Iowa State University.

Background

Enrollment in Landscape Construction (HORT 444, Iowa State University; HORT 358 Oregon State University) is limited to students of junior or senior standing, and the majority are horticulture students with either an emphasis in landscape/nursery or turfgrass (Table 1). The four-credit course at both universities has two weekly 50-minute 'lecture' sessions and a three-hour laboratory. Experiential learning is used in both settings. The 50-minute sessions combine experiential learning with some lecture, and the laboratory is an opportunity for students to further their technical skills in landscape construction. Overall course evaluations for the past four years have been high, averaging 3.78 on a scale of 1 to 4 (1=poor ; 4=excellent).

Table 1. Student information for two landscape construction classes taught a total of five times.

	HORT 444	HORT 358
Academic Standing		
Jr.	4	25
Sr.	29	102
Total	33	127
Major		
Landscape/nursery	9	36
Turfgrass	21	82
Other*	3	8

*Landscape Architecture, Agronomy, Crop and Soil Science, and Agriculture Education HORT 444, Iowa State University: 2003; HORT 358, Oregon State University: 2000-2003.

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An Integrated

Neither university lists this course as a 'capstone' course, yet it has many elements associated with such a course as described in detail in the literature (Zimmerman, 1991; Wagenaar, 1993; Zimmerman, 1997; and Andreasen, 2004). These elements include expected educational outcomes of: problem solving; decision making; critical thinking; and oral and written communications. The learning activities used to achieve educational outcomes include: case studies, small group work and small group projects, oral presentations, and intensive writing. Each of these learning activities centers around at least one level, if not multiple levels, of Bloom's Taxonomy (Bloom, et al., 1956).

Bloom's Taxonomy is a classification device, and to ascend through the taxonomy requires thinking that is more complex. As students move up the hierarchy, they move from activities that show knowledge, comprehension and application, to exercises which require them to analyze, synthesize and evaluate. The further up the hierarchy students move, the more critical thinking they do. Briefing students on what Bloom's Taxonomy is and how it will be integrated into the course at the beginning of the semester helps them understand how and why the various learning activities fit into the overall course objectives.

Instructional Strategies

To help students further their problem solving, decision making and critical thinking skills, a variety of teaching methods have been incorporated in the course. Many of the methods are related to student-centered learning and require the students to actively participate in their learning. Examples of three successful methods include: case studies; a small group project researching, writing and presenting a landscape bid; and role playing exercises. Examples of these three methods using landscape construction as the genre are described below.

Case Studies

Case studies have long been used in business and academic settings to help students understand administrative and business practices in real-world settings (Naumes et al., 2002). This teaching tool is very useful in landscape construction because it requires students to evaluate the information provided, compare this information to what they already know, determine what is important and what is irrelevant and ultimately provide a solution or make a recommendation. All four of these steps are essential elements of Bloom's Taxonomy and a case study provides a good framework for this type of hierarchical thinking process.

Starting with a simple case study to help students develop skill and confidence in this type of experiential learning is important to initial student success and necessary before moving toward more complex cases. For example, a very simple case study might focus on a product used in landscape construction. Students would be provided with product specifications and

information, background on how the product was used and testimonials from customers. Students can then: list key factors about the product; list factors that affected this product's success in the particular situation; describe how the factors that lead to success in this situation might be different if the product was used in a different situation; and based on this information make a recommendation for an alternative product. Finally, students submit a written summary of the case study to communicate their analysis.

A series of five increasingly complex case studies are used in this class. The final case study centers around complex issues such as, new EPA regulations or the H2-B program for supplemental immigrant labor. A case study like this requires students to use multiple sources to gather information and to work through all six levels of Bloom's taxonomy, with no guarantee of a 'right' answer when they are done. Student comments on this exercise have been interesting and range from "I didn't realize there was so much to think about," to "there is no way to have enough information to make a decision," to "this is a policy someone else has to deal with, not me." Regardless, students thought critically about an issue and interpreted it based on their new or existing knowledge of the topic, as well as other factors such as ethics, economics and their personal belief system. Facilitating a class discussion after the final case study is complete has provided constructive insight on how students interpret and evaluate information.

Researching, Writing and Presenting a Landscape Construction Bid

The ability to develop an accurate landscape construction bid is essential to being a successful landscape contractor. Using an actual landscape project recently completed by a local landscape professional brings this project to life. Students can interact with this individual on the job site during the initial phase of the exercise and again after completing the bid.

This activity requires students to logically think through the steps necessary to install a landscape, use multiple resources to research materials (paving or decking materials, lighting, and plants) and their associated costs, and calculate the expected production rates (time to do a specific task) and costs. Students combine all of this information into a spreadsheet format, as well as write a narrative description of the job and associated costs, and a cover letter for the client. After completing their bid calculation students receive a copy of the actual bid and final cost analysis for the job. Through in-class discussion with the landscape professional, students describe similarities and discrepancies between the two bids, and analyze their accuracy in the bidding process. This reflection and discussion after completing the project is an important step in the learning cycle.

Role Playing Exercise

Landscape construction managers are required to

use written and oral communication daily. Examples of written communication include writing documents for internal use, for clients, and for supply representatives. Oral communication may include giving instruction to a crew, placing orders with a supply company, and fielding complaints from a homeowner or property manager. In all of these situations the professionals need to organize and articulate their thoughts in order to communicate effectively.

Role playing exercises allow students to demonstrate both written and oral communication skills. A number of scenarios can be used, and with a little imagination an interesting, complex and interactive role play can be developed. A good example is one that involves a landscape contractor and a disgruntled homeowner.

The scenario might look like this:

Project: \$15,000 residential installation project including; 30.48 m (100 lineal feet) of retaining wall, (18 m² (200 ft²)) of concrete pavers, 180 m² (2000 ft²) of seeded lawn plus irrigation for that area.

Problem: There were major problems with each component of the job—some the contractor could control, others were beyond his control. The project is now three weeks behind schedule and the homeowners are planning to have a 150-person garden gala in a week to celebrate their new landscape.

Student assignment: Working in groups of four and based on the detailed information provided, groups determine: what the problems are, what can be remedied within a week, what cannot be remedied within that time frame and how these problems will be addressed, and how they will explain this to the homeowner.

Role play exercise: The exercise itself only takes between five and ten minutes. Students select one or two people to represent the contractor, and two people to be the homeowners. Although all members of the group know the details about the scenario, they do not necessarily know what each person will say during the role play. This causes students to think quickly and respond to the evolving conversation. The goal is for both groups to communicate their ideas to the other.

After the exercise is complete, the class provides their verbal critique of the role play. This provides students involved in the exercise constructive feedback on what points they addressed clearly and where they can refine their communication skills. Two key points have come from student comments on this exercise. First, many noted “how difficult it was to listen to what was being said, rather than interrupting the conversation with my answer.” Others pointed out that “thinking on my feet was more difficult than I thought, even though I knew the answers.”

Summary

Research suggests that student-centered learning can be an effective teaching method in agriculture-related fields (Moss et al., 2002). Providing opportunities for students to be actively involved in a class and to

systematically work through the learning levels of Bloom's Taxonomy can enhance student learning (McCormick and Whittington, 2000). Written comments from student evaluations suggest many students found the three teaching methods described above to be educational and engaging.

Students seeking a career in landscape construction will be faced with a myriad of job responsibilities, many of which will have little to do with the technical aspects of installing a landscape. As with many undergraduate majors, helping students enhance critical thinking, problem solving and communication skills will be important to their future success. With some planning and preparation the three teaching methods described in this article can be incorporated into any landscape construction course. These methods provide an opportunity for the instructor and students to approach a technical subject in a creative and engaging way.

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