An Exploration of Cross-Disciplinary Peer Education in Natural Resources

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ABSTRACT

Forestry and agricultural education programs need to increase their public communication and cross-disciplinary activities. In this article we present a technique, Cross-Disciplinary Peer Education (CDPE), which allowed forestry students to teach student peers from other disciplines about basic forestry principles. Cross-Disciplinary Peer Education is an innovative way to give natural resource and agriculture students (peer educators) the opportunity to educate students from other disciplines (peer learners). In our exploration of CDPE we found (i) peer learners gained exposure to different disciplines and perspectives of the world, and (ii) peer educators improved their communication skills. The primary challenge of CDPE is the additional time required by faculty instructors to prepare for the CDPE experience.

One of the oft-cited weaknesses in our current agriculture and natural resource education programs is a lack of instruction in communicating technical information to people from other disciplines (Haney and Field, 1991; Egan, 1996; Fisher, 1996; Michael and Dasmohapatra, 2001). Cross-Disciplinary Peer Education (CDPE) is a form of pedagogy that offers one solution to this problem. Cross-disciplinary peer education is a combination of two teaching methods: peer education and cross-disciplinary education. According to Shiner (1999, p. 555), "peer education is primarily used to describe the education of young people by young people." The most common illustration of peer education is found in the field of health education on college campuses. Students are trained as peer educators to help disseminate information about health issues relevant to college students, such as responsible consumption of alcohol and prevention of sexually transmitted diseases. Cross-disciplinary education—sometimes referred to as multidisciplinary or interdisciplinary education—is the process of infusing a subject into various disciplines (Jacobson and Robinson, 1990). For example, a specific current event, such as war, may be discussed in a forest products class by examining the influence of rebuilding war-damaged areas on the international plywood market, actively debated in a political science class, and examined for potential new markets in an agricultural economics course. Cross-disciplinary peer education is a pedagogical hybrid of peer education and cross-disciplinary education through which a common topic is presented to students in one discipline (peer learners) by students from another discipline (peer educators). Cross-disciplinary peer education can be utilized in any size classroom and may combine an infinite variety of disciplines. Any type of delivery method may be used, including lectures, field study, or small group work.

A number of studies of the separate concepts of cross-disciplinary education (Jacobson and Robinson, 1990; Johnson et al., 1991; Ewel, 2001) and peer education (Shiner, 1999; Ender and Newton, 2000) have been conducted. However, CDPE is not a common pedagogical research topic in agriculture and natural resources education. The objective of this manuscript is to add to the literature by examining how the benefits and challenges of cross-disciplinary education and peer education currently found in the literature are reflected in five real-life illustrations of CDPE in a university setting and to evaluate the technique's effectiveness as a teaching tool for forestry students. The article begins with an overview of the benefits and challenges of both cross-disciplinary and peer education found in the current literature, followed by a description of five illustrations of CDPE that were conducted at a major southeastern university. Findings include a discussion of the differences and similarities between the literature and the illustrations and recommendations for successful implementation. The article concludes with a summary of the benefits and challenges of CDPE.

Benefits of Cross Disciplinary and Peer Education

Cross-Disciplinary Education

Cross-disciplinary education provides an opportunity for students and faculty to communicate with their peers from other disciplines and to capitalize on diverse interests, training, and epistemologies. Jacobson and Robinson (1990) suggest that common interests among disciplines can serve to draw various programs together and serve as a catalyst for increased interaction. For example, cross-disciplinary education can be used to learn about new perspectives between the biological and social sciences, and to encourage people with different interests and talents to work together (Ewel, 2001).

A benefit of cross-disciplinary education is its ability to break down stereotypes within the university student community. Cross-disciplinary education exposes students from one discipline to students from another discipline and provides a brief exposure to new subject matter. This exposure to new people and ideas results in an input of excitement and energy to the classroom because of the new experiences (Johnson et al., 1991).

Cross-disciplinary education may also serve to reduce the teaching load on individual faculty members and provide a greater diversity of opinions and expertise for the students (Field and Stapper, 1995). This is particularly the case in

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Abbreviations: CDPE, Cross-Disciplinary Peer Education; CWD, coarse woody debris.

team-taught cross-disciplinary courses in which experts from different disciplines are responsible for the collaborative teaching of a single course (Kiefer et al., 1992). Students benefit because they see the connections between different disciplines and this reduces the "pigeon-hole" effect of more traditional single-subject classes (Thompson and Kunkel, 2001).

Peer Education

Using peer educators in the modern university system is an innovative approach to delivering course content to students. Ender and Newton (2000, p. 6) explain that "the influence of peer interactions is paramount during the late adolescent and early adult years as one achieves greater independence from the role of authority." The peer learners, by having peers as teachers, find themselves in a learning situation where there is an element of equality. The possession of knowledge is a result of hard work and study rather than age and experience. Additionally, students' social maturity increases when they are required to participate as teachers and learners in a peer education program (Coleman, 1974).

Miller et al. (2001) argue that this tool has the potential to revitalize undergraduate education by capitalizing on an underutilized renewable resource—students. Peer education can showcase the broad range of experiences and perspectives students bring into the classroom that are often overlooked by more traditional pedagogies. This learning environment provides benefits for both peer educators and peer learners.

The use of "peer-assisted learning" frees students from their conventional, self-assigned role of passive learners and encourages self-motivated learning (Bruner, 1972). Research and practice show that students who participate in learning-related activities retain more information for a longer time (Bean, 2001). However, higher education systems have yet to fully adopt practices that encourage students to become involved in their own education.

Students are selected to participate as peer educators because of their existing knowledge. As teachers, peer educators need to be informed of their responsibility to communicate knowledge effectively. In their handbook for peer educators, Ender and Newton (2000, p. 3) explain this role and its resulting responsibilities:

> In your role as peer educator, we expect you will be assisting others through educational activities that professionals around you would be performing if you were not available. However, your appointment is not a stopgap or cost-cutting measure—you are serving in this role because you have the capacity to be as effective as your professional counterparts—and in some cases more effective—at delivering some types of services while deriving benefits from your own education.

The experience of being a peer educator is not to be taken casually; the faculty instructor of the class expects the peer educator to convey the course material at a professional level. The peer educator thus gains maturity from being responsible for other students' education as well as a clearer sense of the extent of their own knowledge. The peer educators experience an increased ownership of knowledge by educating students from other disciplines. Often for the first time, peer educators serve as experts in their own disciplines. Students may realize that they have attained skills and knowledge related to their major that separate them from the general public.

Mann (2002, p. 8) incorporated a peer education project in the Department of Biosystems Engineering at the University of Manitoba and reports the "most important benefit we observe is the development of students' oral communication skills." Good oral communication is essential in the professional world. According to a study conducted by the National Association of Colleges and Employers (2003), which ranked personal qualities that employers seek, communication skills was ranked number one; within the discipline of forestry communication skills are cited as a requirement for new employees (Frost, 2001). Yet many corporations and industries report a lack of communication skills among recent college graduates (Sample et al., 1999).

There are also benefits specific to CDPE that reflect more personal development on the part of the peer educators. Meeting peers from other disciplines means peer educators are exposed to different viewpoints, prejudices, cultures, and personalities. The peer educators must think about what they say, how they say it, how they behave, and how they react in front of the peer learners. The peer educators must also have empathy for students who are new to a discipline or topic. As Ender and Newton (2000, p. 1) explain, this experience is a chance to "make positive and in some cases significant differences in the lives of other students." If peer educators are made aware of the importance of the experience to peer learners, they will take the experience more seriously and behave more like technical experts. In addition, peer educators gain self-confidence through their experiences in the classroom (Badura et al., 2000).

One of the well-documented benefits of using peer educators stems from the age similarity between educators and learners. With peer education, students may be more likely to ask questions after a presentation or lecture because they do not feel as intimidated as they might by a faculty instructor. According to Whitman (1988), peer education improves student learning because students feel more comfortable admitting to a peer that they do not understand the material. Peer learners are more willing to ask questions and speak up when something is not clear (Whitman, 1988). This does not reflect disrespect toward the peer educator; rather, it is a sign that peer learners feel at ease in the learning environment and do not fear exposing their lack of knowledge. An added bonus to peer education is the opportunity for more creative brainstorming because students feel freer to express their opinions (Hogan et al., 2000).

Another benefit of peer education is improved student outcomes. Grossman (as cited in Nelson, 1994) states that exam grades for students from discussion sections led by advanced undergraduates were higher than those for students from sections led by faculty. Nelson (1994, p. 51) suggests that the reason for higher exam scores is "that advanced undergraduates had clearer recollections than faculty of the challenges in learning the discourse peculiar to the discipline."

Challenges of Cross-Disciplinary and Peer Education

Challenges of Cross-Disciplinary Education

Cross-disciplinary education programs can be challenging for both faculty and students. Breakdowns in communication,

trust, and respect among participants can occur. Satin (1987, p. 64) identifies honesty and respect as essential before "disciplines can communicate their values, knowledge, and skills, and learn those of other disciplines." However, in three of the four interdisciplinary programs that Satin (1987) describes, failure was due, in part, to a lack of honesty, respect, and trust among members and disciplines.

Cross-disciplinary efforts require the cooperation of a number of programs and departments. Mutual interests of university teaching faculty must converge to make cross-disciplinary programs viable (Jacobson and Robinson, 1990). The organization and implementation of cross-disciplinary courses also make additional demands on faculty in terms of personal commitment (Pirrie et al., 1999). This challenge is exacerbated if the faculty member is working at an institution with satellite campuses. According to Treants and Derr (1981, p. 101), "setting up and supervising the field component for the first time was very time consuming for the course coordinator." The course coordinator may also be challenged to recruit a mix of students while retaining a level of comfort or feeling of equality among peer learners and peer educators (Nichols, 1981).

The evaluation of a cross-disciplinary course can pose difficulties for faculty that are not encountered with a single-discipline course (Bridgewater and McDonald, 1983). Faculty and peer educators are challenged to develop an evaluation instrument that truly reflects the goals and objectives of the course(s). Faculty cannot rely on standard evaluation forms often used by universities to determine teaching effectiveness. The evaluative method used should bring the views of the peer educators and peer learners together to provide a vehicle for program development or redesign (Bridgewater and McDonald, 1983).

Challenges of Peer Education

The pedagogical method of peer education is not without its drawbacks. The term itself has been criticized for being somewhat ambiguous (Shiner, 1999). Goldschmid and Goldschmid (1976) found five different types of peer teaching: discussion groups, peers as proctors, student learning groups, learning cells, and student counselors. *Discussion groups* are seminars led by teaching assistants who are used in large classes to provide an opportunity for small-group discussion. *Peers as proctors* involve undergraduate student teachers who have taken the course previously assisting with aspects of the class instruction. *Student learning groups* are self-directed, independent groups that often function without an assigned "instructor" student. *Learning cells* are pairs of students who alternate between the role of asking and answering questions. *Student counseling* involves an upper-class student who is assigned to a group of first-year students to help them adjust to their new environment and classes. It is difficult to reach common conclusions or even to develop a solid research framework around a term so diverse. Counseling-oriented peer education may be more accurately described as a *peer program* whereby students are taught methods of resistance to peer pressure. The methodological and epistemological issues are very different for peer programs than for peer education, because in peer programs the peer educators are trained to deal with emotional and social issues and their primary role is to teach the peer learners techniques to cope with peer pressure and social pressure. Peer education, in contrast, requires the peer educators to teach technical subject matter to the learners.

The issue of ownership is also a potential challenge with peer education (Shiner, 1999). Often what is defined as peer education may be *delivered* by peers but is actually *developed* by nonpeers (e.g., instructors and professors). A peer educator may be presenting materials to her or his peers, but is doing so at the directive of a nonpeer instructor. Without a sense of ownership of the material, the presentation may lack excitement and involvement on the part of the peer educator, which in turn is reflected in the student participation and involvement of the peer learners. To encourage ownership of a peer education experience, steps must be taken by the supervising instructor to empower and involve the peer educator as much as possible throughout the process.

Another challenge of peer education involves the teaching skill level on the part of the peer educator. Often this is their first opportunity to act as an educator and leader in a classroom setting, which can be intimidating. Again, instructors must work with peer educators to help them acquire and develop the appropriate skills for the classroom (Shiner, 1999).

Related to teaching skill among peer educators is the issue of facilitation vs. "doing all the work" (Wagner, 1982, p. 22) for peer learners. American education has a deeply ingrained system of active teacher–passive learner, and it is easy for inexperienced peer educators to feel overworked and exploited in their peer education experience (Wagner, 1982).

A final potential challenge also related to the active teacher–passive learner paradigm involves the common misconception that instructors and teachers who utilize peer educators are somehow shirking their responsibilities, asking a student to lead discussion or present an issue so that the instructor does not have to prepare for class. While this assumption holds little merit given the effort necessary for planning and developing peer education, it is still pervasive (Wagner, 1982).

Application of Cross-Disciplinary Peer Education: Five Illustrations

Illustration 1: Graduate Forestry and Undergraduate Literature Classes

Graduate students in Advanced Forest Ecology gave 10-minute presentations on their research to undergraduates enrolled in Literature and Ecology (Illustration 1 in Table 1). *The objective for the peer educators* was to learn how to present technical research to a general audience, a skill necessary for successful scientists. *The objective for the peer learners* was to be exposed to current forestry research. Twenty-five peer learners participated in the activity.

The peer educators prepared PowerPoint presentations and practiced with the faculty instructors from both courses to confirm that the language and technical level of their presentations were appropriate for a lay audience and scientifically accurate. Although the peer educators were instructed to present in a scientific style, one student chose to include political commentary and emotionally charged photographs in his hypothesis rather than presenting formal data in support of his hypothesis. This created an unplanned comparison of technical vs. emotional presentations of scientific information.

Table 1. Five illustrations of cross-disciplinary peer education projects.

Date	Peer educators were:	Peer learners were from courses in: (no. of peer learners)†	Location of the project	Type of presentation
Illustration 1 Spring 2001	graduate students in advanced forest ecology	literature and ecology (25)	classroom	10-minute presentation
Illustration 2 Fall 2001	undergraduates in forest ecology and silvics	literature and ecology (4)	Appalachian Trail	nature walk
Illustration 3 Fall 2002	a senior forestry major with work experience	agricultural technology, honors (7)	classroom	50-minute PowerPoint presentation
Illustration 4 Fall 2002	undergraduates in forest ecology and silvics	literature and ecology, 2nd year (16)	Appalachian Trail	nature walk
Illustration 5 Fall 2003	graduate student in forestry	mathematics in agriculture (71)	classroom	interactive lecture

† All peer learners were undergraduates.

The peer educators were graded on their presentations and participated in a discussion session to identify techniques for successfully communicating scientific information to a general audience. A majority of the peer educators felt their presentations had "failed" to reach the peer learners because some of the peer learners had fallen asleep during their presentations. All peer educators agreed that the peer learners responded with greater attention and interest to the peer educator who included an emotional appeal as part of his presentation. Because this was our first CDPE exercise, we concentrated the evaluation of the exercise on the peer educators rather than the peer learners; therefore, the peer learners were not evaluated on their participation in this exercise.

Illustration 2: Undergraduate Forestry and Literature Classes

Undergraduates enrolled in Forest Ecology and Silvics who had selected a grading option that included a CDPE exercise led an educational tour about vegetation through fields and forests along a section of the Appalachian Trail for undergraduates from Literature and Ecology (Illustration 2 in Table 1). *The objective for the peer educators* was to review the topic of vegetation distribution (the peer educators had already read a section of their textbook, listened to a lecture, and participated in a lab exercise in forest ecology and silvics) and gain experience in interpreting the natural world for peers from a nonscientific background. *The objective for the peer learners* was to participate in a learning experience outdoors rather than in the classroom and to witness the natural world they had been reading about in class. Four peer learners participated in this activity.

The peer educators prepared by taking a practice walk with their faculty instructor and reviewing the topics and information to be presented. The peer educators discussed and showed the different vegetation changes from an abandoned agricultural field to a mature forest. They also looked at a clear-cut area and discussed how old-field vegetation differs from vegetation that grows following a clear cut. The walk was scheduled for 2 hours on a Saturday afternoon. The peer educators reserved a Forestry Department vehicle and drove the peer learners to the teaching site, about 30 minutes from campus.

The peer educators were graded on the content of their presentation and their ability to communicate in an outdoor setting to an audience that was more accustomed to learning in a classroom. One unexpected controversy arose concerning a student's perception of nature. The peer educators viewed nature (especially forests) as a source of renewable resources, but the peer learner viewed nature as a source of artistic and literary inspiration. A fairly heated discussion ensued between the peer educators and the peer learner that eventually had to be resolved by the intervention of the faculty instructor. The peer learners were required to write a 2- to 3-page response essay about their experiences. The Literature and Ecology faculty instructor graded these essays for style and content. Copies of the essays were shown to the peer educators as a source of feedback on the efficacy of their presentation.

Illustration 3: Undergraduate Forestry Student and Agricultural Technology Honors Class

In this exercise, we were primarily interested in gathering additional information about the impact of CDPE on the peer learners (Illustration 3 in Table 1). The peer educator was a volunteer rather than a student completing a class assignment; therefore, he was not graded on his presentation. The peer educator, a senior forestry major, drew from his cooperative work experience with International Paper and from material learned in forestry classes to prepare a 50-minute PowerPoint presentation aimed at educating agriculture students about the forest industry. The agriculture class was fairly small, seven peer learners, which allowed the peer learners to ask questions at the end of the formal presentation. The peer educator prepared for his presentation independently of the faculty instructor because he had sufficient presentation experience. The agriculture faculty instructor created a series of questions for the peer learners to answer after the presentation. The questions included:

- Summarize any new information you learned from the forestry presentation.
- Do you see any benefits to having peer vs. faculty presenters?
- What is/are the negative aspect(s) to having a peer vs. a faculty member teach?

Overall, the feedback received from the peer learners was positive. For example, one student commented that "presentations that are made by peers seem to be a little better because the peer is close to our age." Another student wrote, "the main benefit of a peer versus a faculty member is looking at the topic in a different perspective. The teacher may be more knowledgeable of the subject, however, the student may present the subject better to the class based on his/her personal ex-

perience." Finally, two of the peer learners agreed that although peer educators may be able to relate easily to students, "a faculty member will have a broader perspective and will give a more advanced and deeper understanding to the class."

Illustration 4: Undergraduate Forestry and Literature Classes—Year 2

In this exercise, we wanted to reuse the CDPE exercise described in Illustration 2. During the first use of this exercise, a conflict had arisen between the peer educators and a peer learner about clear cutting; therefore, the faculty instructor included training for the peer educators on how to deal with controversial topics. Peer educators from the Forest Ecology and Silvics class prepared a 2-hour nature walk for peer learners from the Literature and Ecology class (Illustration 4 in Table 1). *The objectives for the peer educators* were to learn about the impacts of agriculture and forestry on the environment and practice presenting controversial information to a nonspecialist audience. *The objectives for the peer learners* were to experience an outdoor classroom and to view nature from a different viewpoint than the environmentalist literature they had read for class.

As with Illustration 2, the classroom setting was away from campus. However, reduced teaching budgets this year prevented the use of a departmental vehicle. Peer educators provided directions and peer educators and learners drove to the meeting location. This arrangement was less successful than having all students ride in the same vehicle because one of the peer learners was 30 minutes late and the lesson began before he arrived. For the lesson, the peer educators had planned a fairly rigorous field exercise, but some of the peer learners had worn inappropriate footwear. After the exercise, the peer educators commented that if they were to lead a group of nonforesters in the future, they would be sure to include suggestions for appropriate dress.

Because the Literature and Ecology class is not limited by major, two of the peer learners who participated in this exercise were senior forestry majors. This created an awkward situation because some of the peer learners knew more about the topic than the peer educators. When the peer learners responded to questions in an informed fashion, the peer educators raised the technical vocabulary of their presentation. Thus, the other peer learners were unable to follow the discussion. To avoid this situation, screening of the peer learners should be conducted by the faculty instructor. Regardless of the high technical level of the presentation, the nonforestry peer learners found the presentation rewarding. In one of the response essays, a peer learner said he thought it would be "neat to study forestry."

Illustration 5: Graduate Student in Forestry and Mathematics in Agriculture Class

In this exercise, we were interested in assessing whether CDPE creates an environment where peer learners successfully gain new knowledge. Therefore, the peer educator (a forestry graduate student volunteer who was not graded on his involvement as a peer educator) administered a prelecture survey and a postlecture survey to assess learning of the peer learners (71 undergraduates in a Mathematics in Agriculture class). Pretest/posttest research methodology enables an educator to see if the content shared with the audience had an affect on the audiences' knowledge and/or perceptions of a given topic (Duncan and Broyles, 2002). Both surveys asked (among other questions) the definition of coarse woody debris (CWD). The peer educator was working on CWD (dead trees, branches, and stumps) in Virginia's forests as part of his thesis and gave an interactive lecture that defined CWD; discussed coarse woody debris' importance to wildlife, vegetation, and people; described some of the disadvantages of CWD; and offered some suggestions for managing CWD in forested ecosystems.

The exercise demonstrated that CDPE was a successful technique for teaching students new information. Before the peer-given lecture, 4% of the students provided a good definition of CWD, 16% provided a good but incomplete definition, and 80% provided wrong definitions. After the lecture, 61% of the students provided a perfect definition of CWD, 36% provided a good definition, and 3% provided wrong definitions. The results of this illustration show that in addition to the benefits of improving career-oriented skills, CDPE is also a successful method for students to learn new material.

The Challenges of Applying Cross-Disciplinary Peer Education

Over the course of several CDPE exchanges, we discovered four major methodological challenges: scheduling, student attendance, timely and appropriate training of peer educators, and authority of peer educators. The following is an overview of each potential obstacle along with a description of the methods used to overcome it.

Scheduling

Allotting time for the CDPE experience requires additional planning on the part of the faculty instructors as well as flexibility within the academic system (Satin, 1987). One technique used in Illustration 1 was to schedule classes with common meeting times. The time session for the Advanced Forest Ecology class was concurrent but slightly longer than the Literature and Ecology course; therefore, the forestry faculty instructor met with the students for 15 minutes at the beginning of class to give last-minute reminders for their presentations and then the class walked across campus to provide the lecture for the Literature and Ecology course.

If it is not possible to schedule a common meeting time for classes involved in CDPE exchanges, an out-of-class time must be selected. This was successfully implemented in CDPE Illustrations 2 and 4, which involved nature walks given by peer educators. The students from both classes met for a 2-hour hike on a Saturday afternoon. As with any out-of-class experience, transportation was an issue. When the responsibility for transportation was placed on the peer educators (the situation in Illustration 4) it required additional planning. The forestry students were required to develop a set of directions for the literature students to find the trail head. Having students drive individually to a designated meeting place (Illustration 4 in Table 1) introduced attendance and late arrival issues. One of the peer learners arrived late and missed the first 30 minutes of the nature hike. An alternative but more expensive transportation solution used in Illustration 2 was to use the Forestry Department vehicle to transport students.

Attendance

Lack of attendance during the CDPE session is a serious problem because the information and experience cannot be duplicated. One of the methods of ensuring high attendance is to create an assignment related to the exercise. This has worked successfully in several CDPE sessions. In Illustrations 2 and 4, the peer educators were graded on the information they provided during the hike. In turn, the peer learners were required to write an essay about what they learned. Assigning tasks related to the peer-teaching sessions resulted in unexpected opportunities for additional out-of-class CDPE. During Illustration 4, the peer educators offered their email addresses to the peer learners when they learned about the required essays. They told the peer learners to contact them if they needed additional help.

Training of Peer Educators

Successful CDPE requires peer educator training (Whitman, 1988; Ender and Newton, 2000). Few students have had teacher education or public speaking courses aimed at presenting technical information. Thus, in the majority of CDPE experiences some amount of peer educator training will be required. In Illustration 1, peer educators practiced their presentations before the faculty instructors from both classes to receive feedback on the accuracy of their presentations (by the forestry instructor) and the academic level appropriateness to the audience (by the literature instructor). In Illustration 2, we also saw the importance of training peer educators to handle potential conflicts that may arise from the topics being presented. In Illustration 5, the graduate student showed his PowerPoint presentation and discussed his lecture format with the forestry faculty instructor before presenting to the Mathematics in Agriculture class.

Issues of Authority and Control for Peer Educators

Although peer educator training can help to assure that the correct course content will be conveyed, lack of peer educator teaching experience can create other problems in the classroom environment. Since peer educators lack the authority of age and experience, CDPE sessions may have the potential to go beyond active discourse and become confrontational. In Illustration 2, a heated debate on clear cutting ensued with the peer educators and a peer learner at odds in their opinions. The peer educators may be "experts" on the topic being discussed, but they sometimes lack the maturity and experience to handle controversial topics.

There are several methods to reduce the risk of peer-educator and peer-learner conflicts. In the clearcutting debate, a faculty instructor intervened, changing the situation from confrontational to conversational. Controversy in the learning environment is not always a bad situation. In some instances, peer education allows students to be more creative in their thinking because students feel less intimidated about presenting conflicting opinions to a peer than they would to a faculty instructor (Hogan et al., 2000). However, the presence of a faculty instructor in CDPE sessions is important because faculty can moderate controversial discussions and prevent the situation from disintegrating into a nonlearning environment.

Another technique to provide the peer educator with authority was used in both of the exchanges between the forestry students and agriculture students (Illustrations 3 and 5 in Table 1). In these situations, the peer educators gave a traditional lecture with a PowerPoint presentation. The lecture format placed the peer educators within the power structure of a traditional classroom, resulting in fewer challenges to the peer educator's authority (Manke, 1994).

Differences and Similarities with the Literature

In general, we found more similarities than differences between our CDPE illustrations and the literature on cross-disciplinary and peer education. In agreement with Ewel's (2001) work on cross-disciplinary education, our CDPE illustrations allowed students and faculty from different disciplines to be exposed to different views of the world; however, it did not necessarily change students' opinions on a controversial topic (Illustration 2 in Table 1). Cross-disciplinary peer education provides peer educators with opportunities to practice communicating technical information to a general audience, which is a skill valued by employers (NACE, 2003; Mann, 2002; Sample et al., 1999). Conversely, peer educators may lack maturity to handle their role as educators, which may result in a breakdown in communication between peer educator and peer learner (Illustration 2 in Table 1; Satin, 1987). We did find that CDPE required additional time on the part of faculty educators to make initial contacts, train peer educators, and develop and implement the exercises (Treants and Derr, 1981).

Although there were many similarities between the literature and our CDPE illustrations, only one difference existed. Satin (1987) argued for a formalized structure within the academic system to successfully develop cross-disciplinary programs, but we did not find this to be the case. Informal agreements between faculty instructors involved in CDPE proved to be successful because we had flexible curricula, pre-existing resources, and common topics. Formal structure at the college or departmental level was unnecessary. Because of our flexible curricula, we found it easy to schedule CDPE illustrations; this differs from Satin's (1987) experience with scheduling problems in cross-disciplinary education.

CONCLUSIONS

This exploration of CDPE provides an assessment of its potential usefulness as a pedagogical method in natural resource and agricultural education. Further research and controlled studies of this topic will allow CDPE to develop into a more widespread teaching technique. A large-scale study is under way that provides a structured and quantifiable assessment of pre- and post-learning goals from CDPE exercises. The results of the larger study will improve our understanding of the preliminary findings presented in this paper.

Based on the literature and our experiences, we concluded that CDPE is a valuable but underutilized pedagogical tool in higher education. Cross-disciplinary peer education benefitted both peer educators and peer learners by encouraging and enhancing self-motivated learning, exposing students to different viewpoints, and allowing for more creative brainstorming. Additionally, peer educators (forestry students) improved their oral communication skills and gained maturity. But the benefits of CDPE came with added costs for the faculty instructor; CDPE required additional time to schedule ex-

ercises, train the peer educators, and seek transportation funding for CDPE exercises held off campus. However, with the recent increase in requests from employers for graduates who have strong oral communication skills and the ability to work across disciplines, CDPE provides students with the training to communicate technical information to a general audience, discuss theories and applications across disciplines, and have a broader knowledge of subject areas outside of their discipline.

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