

Helping Future Educators Learn to Teach Through Horticulture: A Case Study of an Experimental Interdisciplinary Course



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Abstract

Numerous studies and commissions have called for undergraduate education reform. While many criticize the system, few horticulture or agricultural education faculty have documented attempts at classroom experimentation with the dominant university teaching paradigm. This qualitative case study provided teacher/researchers a way to explore their students' and their own reactions to an interdisciplinary course based on experiential learning principles. Student focus group interviews, teacher debriefings, and classroom ethnographic techniques were used to gather data that provided a novel perspective on student/teacher interactions and perceptions of the experimental course. Students initially reported apprehension about the course's structure, but over time reacted favorably to experientially-based learning activities. They reported group activities requiring the acquisition of information and skills to be used for a productive purpose (e.g., teaching others, guiding tours) were the most effective in their learning. Students expressed concern with the shallow treatment of horticultural content and were confused by the professor(s) role as guide in the teaching/learning process. From the practitioner perspective, teacher/researchers believed the process of critical reflection on their own practice provided a mechanism to systematically analyze the merits of the experimental course.

Introduction

Undergraduate professional education, like education in the United States in general, has come

under close scrutiny in recent year and calls for reform have been felt on many levels. On a national level the Kellogg Commission on the Future of State and Land Grant Universities (1999) called for changes to undergraduate education to reflect modern realities, challenges, and opportunities" (p. 11). The Boyer Commission's 1996 report argued a need to reform the dominant pedagogy of higher institutions a pedagogy that often features professors delivering decontextualized knowledge to passive undergraduates. On the collegiate level, colleges of agriculture have seen similar recommendations. Kunkel (1992) suggested that colleges of agriculture adopt multidisciplinary approaches curriculum integration would move disciplines together to help produce graduates who can "think globally, to act creatively, to value diversity, to behave responsibly, and to interact cooperatively" (p. 2). More practically speaking, some pioneering horticulture departments have tried to develop leadership, teamwork, and communication skills in their graduates, because they cannot teach students all the subject matter specific information needed in their futures (MacKay et al., 1999). Additionally, some innovative agricultural education departments are implementing curriculum changes that include the adoption of senior projects, colloquia, or other avenues (Graham, 2001) to develop skills in decision-making, problem-solving, and professional communication. These forward-thinking educators realized they could best serve students by encouraging them to use their understanding of basic principles to create new solutions to new problems.

A review of the literature uncovered many studies in agricultural education that have advocated

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improvements in the dominant pedagogy of university teaching (Graham, 2001; Koontz et al., 1995; Torres and Cano, 1995; Wildman and Torres, 2002). Relatively few case studies, however, have described implementation of such improvements in university courses (Davis, 1999; MacKay et al., 1999). In other words, it appears that many university educators are talking about the need to improve teaching, but few may actually be doing or researching it.

Realizing the aforementioned gap between theory and practice, educators at Iowa State University designed an experimental course funded through a United States Department of Agriculture Higher Education Challenge Grant. The course combined the disciplines of horticulture and agricultural education and included experiential and sociocultural learning experiences. In the course undergraduates learned about horticulture and agricultural education as they created educational materials and exhibits for the university's public garden.

This study's theoretical framework is based on the idea that knowledge of interest to practitioners (architects, medical doctors, psychologists, planners, and in this case teachers) is often generated through a "kind of knowing inherent in intelligent practice" (Schon, 1983, p. 50). Schon has referred to this type of knowledge as being generated through an epistemology of practice. A key element to this type of knowledge production is practitioner reflection on his/her everyday practice. In the education field, Mundy and Russell (1994) have brought this epistemology, sometimes referred to as reflective inquiry, to the fore and suggested that practical experience is a significant form and source of knowledge in the learning to teach process.

In another sense, this study's theoretical framework has antecedents in the seminal works of John Dewey (1938) and Lev Vygotsky (1997). Active engagement in practice (teaching) and then reflection on that experience are vital aspects of experiential learning. For classroom teachers, this reflection might also include dialogue with students and those with whom one might team-teach. This dialogical exchange is the cornerstone of Vygotsky's sociocultural theory of learning. In this study it is important to note that we, as teachers/researchers, designed our theory of practice in concert with the design of the course under analysis.

Experiential and sociocultural learning as replacements for the traditional lecture-recitation-lab format have received renewed attention in discussions about how to reform undergraduate education. Experiential learning involves learning by doing, or actually engaging in an activity, and then formally reflecting, or thinking about what was gained as a result of the experience. Dewey (1938)

contended, "there is an intimate and necessary relation between...actual experience and education" (p. 7). As Dewey saw it, experiential educators were responsible for providing experiences to produce learning or growth that is "educative," or useful. Because education is also social in nature, Vygotsky (1997) argued teachers who took advantage of social relationships in the classroom could facilitate the learning process in his or her students.

The curriculum of the experimental course was structured around these two learning theories. We, the teacher/researchers, infused experiential learning theory into the course by engaging students in educational experiences and then asking them to analyze and reflect on the experiences. Experiential learning activities included field trips, the opportunity to plan and conduct educational tours for local children, hands-on horticulture activities, and opportunities for individual reflection. We incorporated sociocultural learning theory into the curriculum as well, altering the social climate of the classroom to facilitate social or cooperative learning--students worked in groups to complete projects and assignments such as garden exhibit designs, plant lists and budgets, lesson plans, and the elementary student conservatory tour.

Purpose and Objectives

The purpose of this case study was to improve our own teaching practice by documenting and analyzing students and teachers reactions to the experimental course. The study's objectives were to determine students':

1. Perceptions of the experiential nature of the course
2. Satisfaction with specific aspects of the course
3. Thoughts about the effectiveness of instructional strategies and assignments
4. Perceptions of the usefulness of the course's horticulture and learning concepts to their future careers
5. Perceptions of qualitative differences of the course from other university courses

Methods

Context of Case Study

"Teaching Youth through Horticulture," Hort/AgEd 282X, was an experimental course offered for the first time in the spring semester of 2001. This interdisciplinary course combined instruction in basic horticulture with theories of learning in an agricultural context (Haynes, 2001). The three-credit course met four hours on Mondays and one hour on Wednesdays for the entire semester. The course had two instructors from two departments: one from Horticulture and one from Agricultural Education.

The course culminated with students' development of educational materials and plans for exhibits for the university's public garden.

We, as researchers, employed both classroom ethnographic techniques and focus group interviews to gain a more complete picture of the student/teacher interactions and perceptions of the experimental course. Krueger (1994) has suggested that focus group studies have the ability to uncover explanations of attitudes and perceptions, while Fetterman (1998) argued that ethnographic techniques could detect predictable patterns of human thought. By combining these two methods, a more complete and accurate picture of events (a triangulated approach) was designed. Throughout the course, ethnographic field notes were recorded during class sessions and at teacher debriefings after class. At the course's completion, three focus groups were conducted to determine student opinions of class structure, organization, and content.

The population was the 23 students who completed the course and their two teachers. Seven of the students were male, 16 were female, 12 students were sophomores; seven were juniors, and four were seniors. Students came from three departments: 13 students from Agricultural Education, seven from Horticulture, and three from Elementary Education.

Focus Group Interviews

Three 90-minute focus groups were conducted to detect patterns and trends across the groups. Krueger (1994) has suggested that focus groups should range from four to 12 participants to allow opportunities for individuals to talk and to provide for practical logistics and management. In this study, the three focus groups fell within this range, with eight, eight, and seven students participating, respectively. To provide opportunities for a wider range of discussion, researchers consciously avoided grouping all students with identical majors in the same focus groups. Focus groups were conducted during the time scheduled for a final examination and were mandatory. Each focus group followed a format similar to that outlined by Merton et al., (1990). Two graduate students conducted each focus group. The graduate students had recently completed a course on focus group techniques and two of the three focus group leaders had led groups in the past. The lead research modeled focus group procedures prior to the interviews, thereby promoting consistency of methods. One moderated the interview while the other took field notes. Interview questions were structured around five questions:

1. How did you feel about the experiential nature of this course?
2. (a) What was the most enjoyable aspect of the course? (b) What was the least enjoyable aspect?

3. (a) What instructional strategies/assignments did you find most effective? (b) What instructional strategies/assignments were least effective?

4. Horticulture students: How will you be using the learning concepts in the future? Education students: How will you be using the horticulture concepts in the future?

5. How was this course different than other courses you have taken at the university?

Immediately following the interview, undergraduates were read the salient points made during the interview as interpreted by the focus group leaders. Undergraduates were asked to comment on the accuracy of these interpretations, thereby confirming the major themes discussed. To ensure greater accuracy, all interviews were audiotaped and transcribed, serving as primary data sources. Analysis of data followed the procedures set forth by Krueger (1994). First, researchers voiced their impressions with each other of the interview's salient points immediately after the participants departed. Second, raw data from interview transcripts were coded for organization into patterns of frequency of response using the "bins" approach (Miles and Huberman, 1984). These patterns were then integrated into the study's findings based on what was most of reported.



Figure 1. At times students were concerned or confused by the professors' role as guide in the teaching and learning process; for example while trying to analyze and draw a garden site.

Ethnographic Approach

Ethnography focuses on detecting predictable patterns of human thought and behavior through direct observation (Fetterman, 1998). To create an ethnographic record, a participant observer (graduate research assistant) recorded field notes (or observations) during each class period. The graduate student ethnographer had recently completed a course in field based research techniques and was mentored by one of the lead researcher who was an experienced qualitative researcher. Conversations,

lectures, and behaviors of students and instructors were observed and documented. In addition, after-class debriefing sessions between the instructors were recorded via field notes.

The researchers established validity, credibility, dependability, and confirmability, all-important in establishing the truth-value, applicability, consistency, and neutrality of qualitative research (Erlandson et al., 1993). Validity was established through triangulation; multiple sources of data were used. Member checks were performed as researchers summarized data and allowed respondents to clarify any misrepresentations. Credibility was obtained through prolonged engagement with research subjects; the graduate student researcher was present and recorded observations at every class session throughout the semester. Dependability was achieved with audiotaped conversations and written notes. Excerpts from raw data included in the study and the audit trail both provided confirmability.

Biases and personal experiences of the graduate student participant observer influenced interpretation of the classroom data. Because she knew both instructors personally and understood the theory behind the curriculum design, she may have brought a positive bias to her analysis of data. Realizing this, she tried to “bracket” her biases by explicitly stating them prior to analysis of field notes. As with all studies based on ethnographic techniques, the possibility exists that biases influenced data interpretation and subsequent conclusions and recommendations.

Findings

The findings gleaned from each focus group question are followed by ethnographic data derived from classroom observations and instructor debriefings.

1. How did you feel about the experiential nature of this course?

Focus group findings were generally positive regarding the experiential nature of the course. Students described the experiences as “beneficial,” “enjoyable,” and “interesting” (student interviews). They expressed appreciation for the hands-on learning activities provided to them. “I liked the fact that it was more hands-on learning than reading textbook material and being quizzed over that. That was a nice change” (student interview). All three focus groups said the practical experienced gained from working with children when conducting educational tours for local third graders was valuable. Students also saw the field trips as valuable educational experiences. Instructors were encouraged by the level of engagement exhibited by students. “The class [field trip reflection] went well. Students were interested and engaged because they

were the ones who took the pictures, and they talked about their answers” (debriefing).

Students who lauded the hands-on aspects of the course also expressed a need for more experiential learning opportunities. “I thought we’d go somewhere every Monday to see things and practice. We only did that a few times” (student interview). Some students expressed that any amount of lecture in an experientially based course was too much. “[Lecture] goes the opposite of what they’re teaching in this class. I thought it was so ironic” (student interview).

Although most responses to experiential learning were favorable, students expressed some discouragement with adjusting to this different teaching and learning style. Early in the semester a student lamented, “this course is so frustrating!” (field notes). Students said they did not always “know what you [the instructors] expected” (field notes), and to many students, class seemed unorganized at times. Instructors, however, felt very well prepared and organized, and praised the time provided by the USDA grant funds.

2. (a) What was the most enjoyable aspect of the course? (b) What was the least enjoyable aspect?

Students in all three focus groups agreed that the most enjoyable aspect of the class was having the opportunity to work in groups throughout the semester. This group work not only facilitated the assignments, but because the course integrated the Horticulture and Agricultural Education departments, friendships occurred with students outside their major. Students in all three focus groups also reported that they enjoyed taking a class that featured a variety of outside experts as well as the two instructors. Two of the focus groups mentioned that they liked doing things, not just listening or reading. Students enjoyed the social structure of the class sessions, laughing and joking at almost every meeting (field notes). “Overall, it’s been a fun class...” (field notes). Instructors also enjoyed teaching the class. “I love this class...it’s a real favorite [of mine]” (instructor debriefing).

Although the students enjoyed the sociocultural learning format of the class, they thought the least enjoyable part of the course included the long Monday class sessions. Oftentimes the Monday lab periods were not devoted to field trips, but rather, became an extension of the regular class. Some of the students perceived these days as “four hours of lecture” (student interview), even though formal lecture actually occurred on four days during the semester and lasted less than an hour each time (field notes). Students said they wanted “lab to actually be a lab time to work on projects or other individual activities” (field notes). Instructors agreed that Mondays were too long. They needed to “break things

up” more (instructor debriefing). Instructors disagreed, however, with students' ideas to devote more lab time to group work, seeing their requests as “unreasonable” (instructor debriefing).

In addition to the long Mondays, all three focus groups mentioned that the organization of the course made it hard for them to follow. They thought that time could have been used more efficiently, and that the instructors didn't “have everything worked out ahead of time as they should have” (student interview). Students asked for clarification regarding assignments almost weekly eleven times during the semester (field notes), even though all assignment descriptions and due dates were provided in writing.

3. (a) What instructional strategies/ assignments did you find most effective? (b) What instructional strategies/assignments were least effective?

Students believed that the most effective instructional strategy was experiential in nature: the opportunity to plan and lead local third graders on educational tours of the conservatory in Horticulture Hall. “Giving the tour of the conservatory was really good...bringing the kids in and doing it instead of just talking about it” (student interview). Most students found the reflection (a discussion of what worked and what did not and how the students adapted to the children's reactions) immediately following the tour beneficial as well as the oral critique of their performance provided by the third graders' principal. Students reported the interaction with children was an excellent learning opportunity; it was fun, and the activity boosted their confidence in using newly learned material. Students commented, “this is going great!” “We can do this!” (field notes). Instructors praised students for their hard work and creativity. They admitted that students still had to overcome some old habits such as “talking at” the children instead of engaging them, but instructors were “glad we did it. The students learned a lot” (instructor debriefing).

In addition to experiential learning experiences, sociocultural ways of learning were seen as valuable. In-class presentations of learning theories by the students themselves, who first had to research the topic, were believed by most students to be an effective assignment. Although focus group consensus was that too much time was spent on the unit, students generally thought the material was useful and interesting, and they enjoyed the opportunity to teach and learn from each other. “I learned a lot by that. Being in a group, coming up with a learning example, was very effective” (student interview). One in-class group reported they learned the most while working with the other members of their own group, and not as much from listening to other groups' presentations. Most students believed that teaching

and learning from their peers was a valuable experience. Instructors also thought the learning theories presentations were effective and valuable (instructor debriefing).



Figure 2. Students reported group activities requiring the acquisition of information and skills to be used for a productive purpose, for example guided tours, were the most effective in their learning

4. Horticulture students: How will you be using the learning concepts in the future? Education students: How will you be using the horticulture concepts in the future?

The horticulture students said the concepts would be useful in a variety of their upcoming dealings with the public. For example, a student commented, “I realize how little information other people know that I take for granted, so I have to teach other people the basics build on what they know and then go from that” (student interview). One student reported that he would be doing an education internship at a public garden, so the concepts gained would be directly applicable to his intended career. Another student reported the exact opposite: “I thought maybe I'd like teaching, but [now I know] that education...is not my thing” (student interview).

The education students felt they did not receive enough horticulture content and wished for more information. Students in two of the focus groups expressed a desire to “do stuff in the greenhouse downstairs” (student interview,). Many expressed that they “got some nifty ideas” (student interview), but would need supplemental information to be confident in teaching horticulture to youth. Instructors also saw the need to infuse more horticulture content, and were “shocked at how little the hort[iculture] students knew” (instructor debriefing).

5. How was this course different than other university courses you have taken?

Although students praised many aspects of the course, the high number of contact hours, the number of assignments, the level of frustration

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among the students, and the lack of course and instructor organization were cited as negative differences (student interviews). One student commented that he had “never taken a class that lasted so long” (field notes). Students reported that this class differed from others taught at the university in a variety of ways. Students cited the absence of multiple choice tests, the field trips, the interaction with the teachers, the experiential learning opportunities, the lack of daily lecture, the amount of input and reflection, the practical and real-world material, and the interdepartmental nature of the class as positive differences (student interviews).

Conclusions, Discussion and Implications

Students liked experiential learning, responding enthusiastically to the field trips and the assignments that called for them to apply their learning to real situations. Their understanding of experiential learning, however, may have been incomplete, as evidenced by their comments regarding weekly field trips. This lack of understanding may have led to frustration. Students did not appear to understand that some of the experiential learning experiences were subtler than others (for example, the realization that students learn more from their own groups than they do from other groups) or that reflection was a critical part of experiential learning. Students also complained that the class seemed very unorganized at times, but the instructors said that they felt very well organized for the class. The students' incomplete understanding of experiential learning may have contributed to their disappointment in not having more experiential learning opportunities and their discomfort with class organization.

Hort/AgEd 282X differed from other university classes in a variety of ways. Students saw most differences as positive. The negative differences may have been tied to preconceived notions of the organization and type of learning that “should be” found in a university course. For example, some students were uncomfortable with a course where the teachers facilitated student learning, rather than dispensing information. In addition, some students were perplexed by the instructors' admission that they were learning right along with the students. This again may not have fit with students' preconceived notion that a teacher knows everything about his or her subject.

Many student complaints and frustrations could be anticipated and then quelled with some well-timed explanations. This approach is consistent with the findings of MacKay et al. (1999), which called for a more transparent approach to teaching. In the future, we might clarify several areas of the course's theoretical underpinnings, thereby increasing

students' opportunity to understand the course's organization and objectives. We plan to more clearly explain the concept of experiential learning early in the course, which, we hope, will reduce students' preconceived notions and subsequent confusion with course organization. Throughout the course, we plan to help students identify when experiential learning is taking place. An increased understanding of the scope of experiential learning may help students “make sense” of the course's organization. In addition, we plan to inform students that the lab session time block will be used for a variety of activities (helping to dispel any preconceived notions of what a lab session should be), and warn students that the sessions will usually last for the entire period.

The most enjoyable aspects of the course included working in groups, learning from a variety of people, and doing things. The social components may have been well received because they offered security (students could generate ideas with or double-check uncertain information with group members) and friendship as well as learning opportunities. Students expressed satisfaction in teaching and learning from each other. This finding appears to be consistent with what educational psychologists (Schwartz et al., 1999) have found with regard to the motivational incentive learners have when contributing something to others.

The most effective instructional strategies or assignments were employed in the conservatory tours and the student presentations of the learning theories. In both cases, students learned new information in order to teach it and teach it well. Students recognized that actually doing something real was a more effective learning strategy than just reading or hearing about it. Because students perceived these types of assignments as effective, we plan to increase the number of these types of activities in the future.

Students' least enjoyed the long Mondays. Students may have expected traditional “lecture” periods that would involve listening to instructors and taking notes, and traditional “lab” periods that would consist of hands-on learning experiences. This class may have gone against those preconceived notions, leading to students' discomfort. Additionally, many students are accustomed to early dismissal from university labs. When early dismissal did not occur, it may have led to student frustration.

Horticulture students saw the value of learning about learning theories; they anticipated using the concepts in future dealings with the public. Education students did not believe they received enough horticulture concepts to be able to confidently teach horticulture to youth. Based on student comments and our own observations, not enough horticulture content was provided in the course. For the next iteration, we plan to insert horticultural lessons into the “long Mondays.”



Figure 3. Students engaged in the process of critical reflection on their own practice to systematically analyze the merits of the experimental course.

Summary

This course demonstrated through student feedback that the content and delivery methods were perceived to be valuable to students. The course's innovative design encouraged students to practice problem solving, leadership, teamwork, communication, and decision-making. Mastery of these skills, according to Kunkel (1992), will be required of society-ready graduates, and the opportunity to practice these skills will give our students a head start as they enter the fast-paced, unpredictable global world of work.

We, like many others who critically reflect on practice, learned more from what could be improved than from what worked well in this undergraduate course. The use of reflective inquiry helped us understand our teaching more fully; therefore, we believe it could be fruitful for other teachers of agriculture to share this type of knowledge based on an epistemology of practice and reflection (Schon, 1996). In this case, the course's novel design and methods of inquiry, however, were not without risks of official punishment and professional isolation (Shor, 1996). Punishment and isolation may result from experimenting with both the dominant pedagogy and with the dominant research method for inquiring about teaching in agricultural education. Official punishment could come from low student evaluations (often linked to tenure and promotion) that might result from challenging students with unfamiliar experiences that stretched their comfort level. Our research could be isolated as some journal reviewers may be somewhat suspicious of "research" on teaching that is based on practice, reflection, and the voices of students and teachers. These risks are real. Nevertheless, we believe little change can be made to the status quo until different approaches are applied to teaching and to the research of teaching and learning in agriculture.

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