# Adding Value to Agricultural Education Coursework: Results of a Collaborative Effort

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## Abstract

The purpose of this study was to describe a value-added component to an existing undergraduate agricultural education course. Through collaboration with another department at the university, two opportunities for current students to earn credit while expanding their content and pedagogical knowledge in the environmental sciences were offered. Two objectives guided the study. Objective one examined the participants' perceptions regarding the worth of the experience. Objective two was directed at describing participants' perceptions of their current knowledge of, and the importance of understanding, specific environmental science topic areas. Twelve undergraduate students participated and completed the survey instrument. Results showed that students considered the experience to be worthwhile and that their knowledge increased. The results also indicated that students' perception of knowledge was lower in all cases, when compared to the importance of understanding specific environmental science topics. As a way to close this "gap" in knowledge, such collaborations should be encouraged to provide meaningful learning experiences for students.

## Introduction

The National Council for Accreditation of Teacher Education (2007) stated that teacher candidates must know the subject matter they plan to teach and be able to explain important concepts related to the subject matter. Similarly, the American Association for Agricultural Education (2001) outlined, in its conceptual framework, the national standards for teacher education in agriculture. The conceptual framework indicated the need for agriculture teacher preparation programs to provide experiences in technical content and pedagogy. Another indicator of meeting these standards relates directly to enhancing the delivery of technical content by collaborating with stakeholders to prepare the teacher candidates. Stakeholders, as outlined in the framework, include other units in the college and university.

With current budget issues in many colleges and universities, it is becoming harder to provide undergraduate students with the learning experiences needed to be successful in their future careers as educators or be employed in the business of agriculture. Because of lack of funds, resources, or even faculty expertise, individual departments may not be able to provide all of the educational opportunities and experiences that can best prepare students for their future careers. Thus, partnerships must be sought out and formed to provide the best possible learning experiences for undergraduate students in various content areas of agriculture. Specific to agricultural education, it has been found that teacher education programs are accountable to prepare effective secondary teachers of agriculture (Luft, 2004). Through collaboration with professionals in other departments, teacher educators can ensure that teacher candidates are receiving hands-on training in various content areas of agriculture, while enhancing their ability to teach the content.

Loss of credit hours in programs because of university or Department of Education requirements has led to fewer technical agriculture courses being offered through the teacher education program at hand. Griffin (1999) pointed out that expectations of teachers include that teachers understand their respective discipline and also that teachers know how to use multiple teaching strategies. Thus, with continued requirements placed on teacher education units, teacher candidates may not have the opportunity to experience coursework in areas such as small engines, wildlife, aquatics, welding or other content areas in agriculture prior to entering the classroom to teach.

Another plausible reason for this lack of experience in technical agriculture stems from the type of students that are enrolling in colleges of agriculture. Greene and Byler (2004) noted that the profiles of students within colleges of agriculture have changed in the past 30 years. Fewer students entering colleges of agriculture are coming with backgrounds in technical agriculture, fewer are coming from rural areas, and fewer have spent time on farms and worked in agriculturally related jobs prior to entering the university (Nichols, 1976). The trend of fewer students coming from agricultural backgrounds continued well into the 1990s (Dyer, Breja, and Haase-Wittler, 1999). With the current growth rate of suburban areas, the trend that was observed in enrollment and student experiences over 30 years ago does not seem likely to change in the near future.

The question then becomes: How do agriculture teacher education programs best prepare teacher candidates to enter the workforce? Teacher candi-

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dates in agricultural education must take part in experiences that allow for practical application of the content. One way to provide these experiences is by forming partnerships with other departments in the college, beyond the traditional classroom setting. The remainder of this article describes one such partnership and student perceptions of the experience. A partnership was formed between the Department of Agricultural and Extension Education and the university's environmental center, which is part of the Recreation, Park, and Tourism Management department (RPTM). The partnership was formed to provide agricultural education students the opportunity to expand their knowledge and skills in the content area of environmental science.

## Purpose and Objectives of the Study

The purpose of this study was to explain how two university departments partnered to provide hands-on learning experiences for agricultural education teacher candidates. Specifically, the objectives of this study were to:

1. Describe the students' perceptions relative to the worth of the value-added component for the course.

2. Describe students' perceived knowledge of and importance of environmental topics being offered through the value-added component of the course.

## Methods

### *The Experience*

The value-added component was initially incorporated into the existing introductory agricultural education course. Because of the low number of students enrolled in the introductory agricultural education course for the fall semester, it was decided to offer this opportunity to all current Agricultural and Extension Education undergraduate students. Students signed up for an additional course credit through the RPTM department. The credit can be used in the student's program as an elective agriculture course, or as an overall elective credit for the university. The registration of the students was handled through the environmental center. The one credit lab options were 15 hours each in duration, occurring in the classroom and in the outdoors, which required students to dress for the weather. The two labs offered were scheduled outside of normal class times (i.e. weekends) to avoid conflicts with other classes. Students were responsible for transportation to the environmental center. Prior to selecting the two lab offerings for the semester, students received handouts which contained information pertinent to the potential offerings for this value-added opportunity.

Laboratory choices could vary from year to year depending upon availability of instructors, interest of the agricultural education faculty and students, and funding/other support for the partnership. However, the major focus of the value-added component is providing quality learning experiences to the students, which were not otherwise available through the traditional coursework. While the importance of knowing the content is undeniable, the importance of knowing how to present the content cannot be overlooked either (Ball, 2000). Thus, each of the value-added components was designed in a way that not only provided enhanced understanding of the content, but the experiences were developed to demonstrate a variety of teaching methods that can be used within the content area.

Out of four possible laboratory options students were asked to choose three of the laboratory options and prioritize the choices. After reviewing the students' choices, the two most popular laboratory options were planned for, and implemented. Possible dates for the value-added component were chosen by the instructors at the environmental center.

During the fall 2007 semester the two workshops offered were: "Sampling, Stocking Percent, and Silviculture: A Basis for Teaching Forestry" and "Animal Care and Handling for the Classroom: Raptors, Amphibians, and Reptiles." During the forestry workshop, students participated in hands-on activities such as tree identification, calculating board feet in standing timber, and a management plan for the forest. The animal care workshop allowed students to examine daily care and feeding of the animals, handling of the animals, and other requirements of these animals in wild settings. Students were permitted to enroll in none, one, or both of the value-added opportunities. Both workshops focused on giving the students experiences in content and pedagogy in the content area.

Because of low enrollment of undergraduate students (N = 13), the opportunity was opened up to current agricultural education teachers in the state. The teachers could sign up for graduate credit for the experience or they could use these hours towards the state's professional development requirements. The teachers did not take part in the research component of this experience, since the focus was on undergraduate opportunities.

### *Data Collection*

Immediately following the experience each undergraduate participant was asked to complete a survey instrument. The students were informed, per Institutional Review Board number 26623, that their participation in this research study was voluntary. All but one undergraduate student completed and returned the survey instrument. A researcher-developed instrument was used in the study. Questions asked related to the worth of the experience, instructors' knowledge, and changes for future workshops. Students also provided information about their knowledge of topics related to the experience (i.e. environmentally oriented) and the per-

ceived importance of these topics to an individual that plans to teach secondary agricultural education.

### *Data Analysis*

A total of 13 undergraduate students enrolled in the value-added component of the course. Utilizing a summated rated scale, participants were asked to respond to ten statements (see Table 1), which measured the perceived worth of value-added component. Through a field test of the survey instrument, two items in the original instrument were removed. A post-hoc reliability analysis was conducted on the survey instrument. Reliability tests were not completed prior to the experience because of the nature of the questions, which related directly to the experience. A reliability of .67 was found using Cronbach's alpha. Nunnaly (1978) reports .70 as being the lower limit for acceptable reliability. However, because of the small number of participants and the fewer number of questions on the instrument that were analyzed for reliability, the alpha was deemed acceptable. Twelve of the 13 students returned the questionnaire for a response rate of 92%. Because of the large percentage of returned questionnaires, no control was utilized for non-response.

**Table 1. Statements used in determining the perceived worth of the value-added experience**

| Statement |
|---|
| 1. I learned a great deal from the value-added component of this course. |
| 2. I wish other courses in the department would provide similar opportunities. |
| 3. I wish other courses at Penn State would provide similar opportunities. |
| 4. The instructors were knowledgeable. |
| 5. The course material is of interest to me. |
| 6. I will use this information in my own teaching. |
| 7. I would recommend this course to others in the department. |
| 8. I can now teach a lesson on the material covered in this course. |
| 9. The value-added component should be expanded to other areas in agricultural education (i.e. – horticulture). |
| 10. I would take advantage of similar opportunities in the future. |

**Table 2: Student participants' knowledge and importance mean scores for each possible topic area offered through the value-added component**

| Topic Area | Knowledge Mean Score (SD) | Importance Mean Score (SD) |
|---|---|---|
| Watershed Assessments | 4.92 (2.40) | 7.58 (2.02) |
| Water Quality | 5.50 (1.57) | 8.00 (1.35) |
| Sustainable Forestry | 5.25 (2.97) | 8.25 (1.55) |
| Animal Care | 6.25 (2.56) | 8.50 (1.57) |
| Natural Resources | 7.33 (1.50) | 9.08 (1.24) |
| Forestry | 5.83 (2.21) | 8.67 (1.30) |
| Wildlife | 5.67 (1.83) | 8.58 (1.38) |
| Soil Nutrients | 6.17 (1.59) | 8.25 (1.29) |
| Water Conservation | 6.42 (1.68) | 8.92 (1.08) |

Note: Scale 1-10; 1 = "no knowledge" or "no importance" through 10 = "much knowledge" or "very important".

## Results and Discussion

The overall mean score of the students' perception of the worth of the experience was 5.4 (SD = .38). A mean score of 5.4, on a six-point scale, showed that, as a group, the participants responded between "moderately agree" to "strongly agree" on the overall scale. Participants in the value-added component of the course felt that the experience was beneficial. The students believed that this type of experience should be expanded to other areas of agricultural education coursework.

While students are able to experience laboratory components in university courses, such as horticulture or animal science courses, agricultural education students may not have the opportunity to combine learning of content and pedagogy in these regular content courses. The current experience allowed students to learn the content while learning about various pedagogies that can be used in the content area. Future applications of the value-added component should explore the option of building collaborations with individuals who instruct courses such as agricultural systems management, animal science, crop and soil science, horticulture, food science, and other content areas within colleges of agriculture.

One deficiency of the current experience was that students were not given time to develop their own lessons based on the experience. The students only "slightly agreed," as a group, that they were ready to teach a lesson using the information learned through the value-added experience. A crucial part to teaching any lesson is planning. Therefore, future applications of the value-added component of the course should include an expanded section that focuses on development of lesson plans that could be used in future lessons. By allowing time for the participants to develop plans during the experience, while feedback is readily available from the instructor, the students may feel more confident in teaching a lesson from the material presented in the value-added component.

The student knowledge mean scores and the importance mean scores for each of the areas examined through objective number two are displayed in Table 2. Participants rated nine topic areas related to environmental science using a 10-point scale. A score of "1" meant that the participant felt they had "no knowledge" of the topic or that the topic was of "no importance" to teachers of secondary agriculture. A score equal to "10" meant that the participant felt that they had "much knowledge" of the topic and that the topic area was "very important" to teachers of agriculture. Knowledge mean scores ranged from a low of 4.92 (SD = 2.40) for

knowledge of watershed assessment to a high of 7.33 (SD = 1.50) for knowledge of natural resources. Importance mean scores ranged from a low of 7.58 (SD = 2.02) related to the importance of knowing how to teach watershed assessment to a high of 9.08 (SD = 1.24) for the importance of knowing how to teach natural resources.

For each topic area offered on the survey instrument, participants' knowledge mean scores were lower than the importance mean score. The lowest mean score for the importance of any topic area was 7.58 out of a possible rating of 10, while all other topic areas were rated at 8.00 or higher. Participants perceived each of the areas to be important for teacher candidates to understand, if they are to become secondary agricultural education instructors. The highest mean score for knowledge of the environmental topics was 7.33 out of a possible rating of 10. The participants' perceived knowledge of the environmental topics was lower for each of the other eight areas. Watershed assessment was the lowest, with a knowledge mean score of 4.92. Since students in this study perceive a need, as can be seen by the lower knowledge scores when compared to the importance mean scores, teacher educators should be focusing on building collaborations with other departments that can allow for such experiences while providing benefit to all involved with the value-added component of courses.

## Summary

Agricultural education programs are being squeezed for credit hours. Teacher candidates are expected to gain knowledge and skills in many different content areas to be adequately prepared to become a quality secondary agricultural education teacher. Content areas range from food science to agricultural mechanics and from horticulture to animal science. Teacher candidates must also take courses in pedagogical approaches and courses in educational policy to fulfill the requirements set forth by state Departments of Education. With these demands placed on teacher education units, finding innovative ways for students to learn the content, while experiencing various teaching strategies, becomes vital. One such opportunity, focusing on environmental science, was examined in the study. Results showed that participants who took part in the experience felt that it was worthwhile and that such experiences should be offered in other agriculture content areas. Results also showed that the participants had an overall lower perceived knowledge mean score for environmental science topic areas when compared to the participants' perceived overall importance mean score for those same topic areas.

When developing a value-added partnership, teacher educators should consider the following five items before beginning:

Teacher educators should select the initial content areas, and explore possible collaborations with other departments, based on a need in the program (i.e. no laboratory space available in the department to offer hands-on opportunities in environmental sciences).

Allow at least one semester of planning time before implementation.

Know the primary contact person for each department involved and develop a schedule for meeting to discuss progress and improvement needed.

Select topic areas with the help of the cooperating department based on their resources and abilities.

Allow student input for the final selection of the topic areas.

By incorporating the five items into the process, teacher educators are able to provide students with meaningful learning experiences that will benefit their own teaching in future years. The planning and decision-making process is also made easier when there is one primary contact from each department. However, each group (i.e. teacher educator, cooperating department, students) have input into the final topic area that will be taught; therefore, encouraging buy in from each group.

Further research should include examination of the students that chose not to participate in the value-added component of the course. Examining non-participants' perceived knowledge and perceived importance of topic areas currently taught in secondary agriculture education may lead to further enhancements of such opportunities. To further understand perceived knowledge of pre-service students, research should be conducted to expand the survey instrument to a broader range of agricultural topic areas. These finding can be used to examine where focus should be given on future collaborations for other value-added components within colleges of agriculture. By exploring the perceived gaps in pre-service teacher knowledge and the perceived importance to future teachers, teacher educators can prioritize the collaborations to be made to best prepare future agricultural education teachers.

Recommendations included exploring other agriculture content areas to determine if gaps in perceived knowledge and perceived importance are similar to that found in the study (i.e. low perceived knowledge and high perceived importance). Priority should be given to those areas where the gap is shown to be the greatest. However, other factors, beyond the student gap in knowledge, must be considered. One such consideration is that of which departments in the college of agriculture, or university, are able and willing to explore such collaborations at a particular point in time.

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