(ISSN 0149-4910)

NACTA

north american colleges and teachers of agriculture

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Vol. 55, No. 1 • March 2011

a publication of the NORTH AMERICAN COLLEGES AND TEACHERS OF AGRICULTURE

2010 - 2011
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Vol. 55, No. 1 • March 2011

NACTA Journal **(ISSN 0149-4910)** is published quarterly by the North American Colleges and Teachers of Agriculture (formerly the National Association of Colleges and Teachers of Agriculture). It is directed toward the scholarship of teaching and learning in agricultural, environmental, natural and life sciences by presenting articles covering topics that treat all aspects of teaching such as methods, problems, philosophy, and rewards at the college level. All manuscripts undergo double-blind peer review. An author's guide for manuscript preparation is available on the NACTA web page: http://www.nactateachers.org/ or are available upon request. Page charges of $75.00 per manuscript are waived if one of the authors is a NACTA member.

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The Journal is published electronically/online and quarterly - March, June, September and December. The issues for the current year are available to NACTA members at this website: http://www.nactateachers.org/journal.html, a login and password obtained through membership is required.

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NACTA Journal

the professional journal advancing the scholarship of teaching and learning in agricultural, environmental, natural, and life sciences

Contents

Using a Teaching Partnership to Improve Nutrition and Exercise in College Students

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Abstract

Developing sustainable obesity prevention strategies is a primary focus for researchers, including those in the college setting. To improve nutrition and exercise beliefs and behaviors among college students a one-semester nutrition and exercise course was created and implemented using an undergraduate faculty-Peer Educator teaching model. The first eight-week session focused on undergraduate Peer Educator training and development of curriculum for the nutrition and exercise course. Six Peer Educators were recruited from undergraduate dietetics and kinesiology classes. A teaching training program was developed based on the WHO: Training of Trainers Manual. Peer Educators provided feedback on topics and course content. During the second eight-week session, Peer Educators (n=6) led weekly discussions with the class (n=39) and faculty (n=2) conducted lectures. At the conclusion of the 8-week class, students reported improved self-efficacy for resisting eating under pressure from others and when physically run down. Students' outcome expectations and intake related to vegetables and fruits improved. Self-reported weekly strenuous and moderate exercise also improved. Despite a small class sample, our results demonstrated that using a peer education model in a class setting can improve some beliefs, attitudes, and behaviors towards healthy eating and exercise.

Introduction

The challenges presented by obesity and being overweight on college campuses are being recognized as important issues by Student Affairs units in the United States. The National College Health Risk Behavior Survey revealed that 30% of college students are overweight or obese and only 7% consume the recommended servings for fruits and vegetables (Lowry, et al., 2000; Hoban, 2006). Additionally, prevalence of obesity increased from 10.9% to 22.1% during the five-year transitional phase between adolescence and adulthood (Gordon-Larsen et al., 2004). These results suggest that transition between adolescence and adulthood, a common age for college students, is frequently accompanied by rapid and inappropriate weight gain.

Indeed, according to the Behavioral Risk Factor Surveillance System, young adults aged 18 to 29 years are the fastest growing sector in the overweight/obese category (Mokdad et al., 1999). There is a general assumption that college students gain weight during their freshman year, a phenomenon that has been called the "freshman fifteen." However, there are only a handful of studies that have actually documented this, with most suggesting gains of four to nine pounds (Levitsky et al., 2004; Racette et al., 2005). While studies have found that the actual weight gain is less than 15 pounds, overweight during late adolescence is most strongly associated with increased risk for overweight in adulthood (Guo et al., 2000; Holm-Denoma et al., 2008).

Interventions that combine healthy diet and exercise behavior modifications that could be maintained throughout the lifespan are recommended for the long-term treatment and prevention of obesity in adults (Centers for Disease Control, 1997; National Heart, Lung and Blood Institute, 1998). Successful interventions in the past have used self-efficacy-based initiatives to improve dietary and exercise habits in the young adult population (Abood et al., 2004; Dishman et al., 2004). Since self-efficacy can be influenced by others, peer education has been used successfully to improve health-related behaviors in smoking cessation (Wechsler et al., 2001) and HIV prevention (Fisher et al., 1996). Peer Educators (PEs) have also been previously used in the college setting to provide nutrition (White et al., 2009) and physical activity education (Khan et al., 2009), as well as supplemental instruction or tutoring in large classrooms (Amstutz et al., 2010) . However, previous studies involving PEs have utilized them for only the implementation phases and no research trials have utilized a PE/faculty collaborative approach to address nutrition and exercise concerns in the classroom setting.

Furthermore, there are limited resources for any program that would attempt to use PEs in nutrition and exercise education specifically in college students. Designing wellness classes for undergraduates has become imperative as the prevalence of obesity continues to increase. This places a particular burden on the colleges of agriculture, where most nutrition programs reside. The research objectives of this

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study, titled Peer education, Exercising and Eating Right (PEER), were to: 1) develop a training model for undergraduate PEs, 2) incorporate PE feedback as faculty and graduate students develop an undergraduate nutrition and exercise curricula, and 3) teach an undergraduate nutrition and exercise class using a PE/faculty collaborative teaching model to study the impact on nutrition and exercise outcomes in a group of undergraduate college students.

Materials and Methods

Development of PE Training Model

The PE training model was based on the United Nations Training of Trainers Manual (ToT) (United Nations, 2003), with nutrition and exercise education-related training content replacing the sexual health focus of the ToT manual. The first four weeks of the one hour/week training program emphasized the role of PEs in educating fellow undergraduate students. The second four-week training period focused on public speaking, co-facilitation, and presentation skills (Khan et al., 2009). The trainers were graduate students, one from nutritional sciences and another from kinesiology. Training topics are listed in Table 1. All PEs were senior-level students in dietetics and kinesiology (three from each discipline), recruited based on class performance and desire to participate. PEs were paired (one from each discipline) and they chose to match themselves with a partner rather than a random or faculty-derived match. It was assumed that pairing the PEs would create effective teaching partnerships since both educators would bring their respective academic training to the class.

Table 1. Peer Educator Training Topics

Week	Training Topics
1	Introduction to training methodology and self-efficacy Introduction to icebreakers, warm-up activities and energizers Peer expectations
2	Evaluation of course content Review of student self-efficacy assessment tools
3	Peer education – theory and practice
4	Motivational tools and techniques in nutrition and exercise behavior Group discussion: What motivates you to change? Group discussion: Barriers to change in nutrition and exercise behavior
5	Introduction to public speaking
6	Co-facilitation skills Develop class activities and discussion questions
7	Practice: Team presentations
8	Practice: Team presentations

Class Curricula Development

Course content for the PE and faculty-delivered class was developed from an eight-week worksite wellness program that had focused on bone health within a theoretical behavior framework (Tussing and Chapman-Novakofski, 2005). Modifications changed the focus to maintaining a healthy weight for this project. Graduate students (n=2) and faculty developed initial power point presentations on proposed topics. During the eight-week training, PEs provided feedback on topics, activities, and overall class structure. Their recommendations were incorporated into the lecture materials before final content validity by a panel comprised of three experts (two faculty members and one Extension Specialist) in the field of nutrition. The major areas for evaluation were appropriateness of content relative to breadth, depth and target audience, accuracy of information, and suggestions for deletion or addition of topics. Table 2 shows that final topics selected.

Table 2. Class Topics for Nutrition and Exercise for a Healthy Living

Week	Topic
1	Balance and Variety Basics of Exercise Prescription
2	Healthy Snacking Fun Physical Activity for Daily Life
3	Portion Control Exercise and Physical Activity
4	Reading Food Labels Popular Fitness Equipment
5	Food for Bone Bone Loading for Peak Bone Mass
6	Review of Popular Diets Energy Costs of Activities
7	Eating Out Alcohol and Nutrition
8	Nutrition to Handle Stress Exercise to Handle Stress

Class Implementation

The eight-week, PE-delivered, self-efficacy-based class on nutrition and physical activity was taught during the second half of spring semester to 39 students. The class was marketed to undergraduates in the departments of Food Science and Human Nutrition, Human and Community Development, and Kinesiology and Community Health by forwarding an email announcement describing the class. The class was titled "Food Science and Human Nutrition 295: Nutrition and Exercise for Healthy Living." Enrollment exceeded the research team's expectations and the cap was raised from 30 to 42 after consulting with the PEs for feasibility and comfort with larger group sizes. Students completed pre-test questionnaires on the first and post-test questionnaires on the last day of class. The questionnaires are described in the instrument section below. The twice/week classes were lecture by faculty for the first day and discussion led by PEs the second day. The structure of the discussions was a five-minute topic review from the previous class lecture followed by two 15-minute activities to enhance self-efficacy, ending with a question-answer period.

The study was approved by the University Institution Review Board. All participants were 18 years of age or older and informed consent was obtained with low risks associated with study participation.

Instrumentation

The investigators were interested in determining whether class participation improved students' self-efficacy, outcome expectations, and behavior with regard to nutrition and exercise behaviors. The evaluation surveys used were Outcome Expectations for Exercise Scale (Steinhardt and Dishman, 1989), Self-Efficacy for Exercise Scale (McAuley, 1993), Weight-Efficacy Lifestyle (Abrams and Follick, 1983), Outcome Expectations for Nutrition Fruits/Vegetables, Low-Fat Foods (Baranowski et al., 2000), Godin Leisure-Time Exercise (Godin and Shephard, 1985), and the Rapid Eating Assessment for Patients (Gans et al., 2003). The questionnaires were chosen because they had been previously validated and used in the adult population, reflected the topics chosen for the class, and surveys specific for college-age adults in these topic areas had not been validated and published. An Undergraduate Faculty Teaching Partnership (UFTP) learner questionnaire was used to evaluate the demographics as well as the students' response to the peer-driven structure of the class, as outlined by the funding agency.

Data Analysis

Cronbach α scores were used to determine internal reliability of the questionnaires. Stepwise regression analysis was used to explain the variability in total post-test scores accounted for by variables of each construct as well as total pre-test scores. Paired t-tests were performed for the pre- and post-scores to evaluate changes in behavior, self-efficacy, and outcome expectations over the eight weeks. Significance was set at $P \leq 0.05$ (SPSS, version 16.0, SPSS Inc., Chicago, IL, 2008).

Results and Discussion

All PEs approved the lecture-discussion format of the class and had positive attitudes toward teaching with the faculty and graduate students as a team. Five of the PEs agreed that the training activities and discussions were purposeful and only one PE disagreed. According to one of the PEs, "I liked doing the discussion activities and the group really liked having someone their age lead." Four PEs stated the need for additional content specific training, public speaking, and teaching practice. The training manual did not have any nutrition and exercise related training since the investigators assumed that the content was basic enough for senior level students to be comfortable teaching. Responses from the PEs indicated that future training models should devote more time for content specific training. Perhaps a competitive PE application process could have selected for students with previous teaching experience. Given the time limitations of this study it was not possible to have a competitive application process for PEs. However, the training methods used in this study provide a basic and novel program specific to nutrition and exercise peer education in the undergraduate setting.

The UFTP questionnaire assessed the academic background and level of the students. Additional questions asked the students what their overall impression of the class was. Thirty-one students answered the question regarding classification and area of study. The class consisted of 12 juniors (39%), 10 (32%) freshmen, six (19%) seniors, and three (10%) sophomores. Seventeen (52%) of the students were from other majors, nine (25%) were from the area of food science and human nutrition, and five (14%) of the students belonged to communication/education disciplines. Over 90% of the students indicated they formed a deeper understanding of class content and 89% said they were more engaged in the learning process as a result of having an appointed PE. However, the investigators only collected this information at the conclusion of the eight-week class. Future interventions should assess the impressions of students at the beginning as well. It is also recommended that better instrumentation specific to assessment of teaching should be used to collect important feedback for improvement in the teaching methods. To meet the goals of this short pilot study, the investigators focused on the impact of this novel teaching methodology on nutrition and exercise outcomes.

At the conclusion of the class, 39 students returned the post-surveys for Exercise Self-Efficacy, Nutrition Self-Efficacy, Outcome Expectations for Exercise, and Outcome Expectations for Fruits and Vegetables, Outcome Expectations for Low-Fat foods, Leisure Time Exercise, and the Rapid Eating Assessment for Patients. Cronbach α test scores indicated a high reliability for the Exercise Self-Efficacy ($\alpha=0.98$), Nutrition Self-Efficacy ($\alpha=0.85$), and the Outcome Expectations for Exercise ($\alpha=0.84$) questionnaires. Reliability scores for the Outcome Expectations for Fruits & Vegetables ($\alpha=0.31$), Outcome Expectations for Low-Fat foods ($\alpha=0.0.48$), and Leisure Time Exercise ($\alpha=0.40$) were low, indicating inappropriate grouping of items in these questionnaires, poor item selection for the target group, or too few questions per construct. Since these questionnaires had lower Cronbach α scores, pre- and post-test changes in scores were assessed on an item-to-item basis rather than as a grouped variable.

The significant changes in pre- and post-test scores are summarized in Table 3. There were no significant changes in pre-test and post-test Exercise Self-Efficacy and Outcome Expectations for Exercise and therefore are not listed in the table. However, the Leisure Time Exercise Questionnaire asked students to report the number of times they engage in exercise for more than 15 minutes during a seven-day period. Mean strenuous exercise significantly improved from 2.95 ± 2.07 to 3.95 ± 2.77 ($P=0.003$). Mean number of times moderate exercise was performed increased from 3.00 ± 2.26 to 4.35 ± 2.33 ($P=0.032$).

The Nutrition Self-Efficacy questionnaire asked participants to respond to questions relating to self-

efficacy in nutrition, with 20 questions separated into the categories/factors of negative emotions, availability, social pressure, physical discomfort, and positive activities (Clark et al., 1991). Results of the paired-t test on mean scores for the factors are summarized in Table 4. There was a significant increase in the self-efficacy scores related to resisting eating when faced with negative emotions and resisting eating under social pressure. The mean scores of the remaining three categories increased, however, the changes were not significant. Analysis of specific items in the Nutrition Self-Efficacy questionnaire showed significant increases in the mean scores associated with resisting eating when students had to say no to others when physically run down and during depression.

Although none of the items on the Exercise Self-Efficacy and Outcome Expectations for Exercise questionnaires showed a significant change, the pre-test responses on these surveys were high and already reflected the desired response. The items that showed significant changes pre- and post-intervention are listed in Table 3. These items related to self-efficacy and outcome expectations for nutrition (Weight-Efficacy Lifestyle, Outcome Expectations for Nutrition Fruits/Vegetables and for Low-Fat Foods,). Other items that changed significantly related to nutritional and exercise behaviors (Rapid Eating Assessment for Patients and Godin Leisure-Time Exercise).

Although peer education has been used previously to improve intake of fruits and vegetables (Buller

Table 3. Paired T-test for Pre/post Scores for Nutrition and Exercise for Healthy Living Class

Questionnaire	Item	n	Mean ± SD	T	P
REAP Scale 1=Usually 2=Sometimes 3=Rarely	Less than 2-3 servings of fruits/day	39	1.82 ± 0.75(Pre) 2.05 ± 0.60(Post)	-2.16	0.037
	Regular salad dressing	39	2.18 ± 0.79 2.56 ± 0.64	-2.90	0.002
	Watch more than 2 hrs of TV/ day	38	2.13 ± 0.70 2.34 ± 0.62	-2.08	0.040
WEL Scale 0=Not confident 4=Moderately confident 9=Very confident	I can resist eating when I have to say "no" to others	38	5.95 ± 2.30 6.74 ± 2.76	-2.32	0.026
	I can resist eating when I feel physically run down	39	5.21 ± 2.76 5.87 ± 2.43	-2.36	0.024
	I can resist eating when I am depressed (or down)	37	4.81 ± 2.42 6.00 ± 2.45	-2.91	0.006
OENLF Scale 1=Strongly agree 2= Agree 3= Unsure 4=Disagree 5=Strongly disagree	If I ate foods low in fat every day I would have more energy	39	2.15 ± 1.16 1.74 ± 0.82	2.731	0.010
	If I ate foods low in fat every day I would have a desirable weight	38	2.03 ± 1.05 1.71 ± 0.87	2.154	0.038
	If I ate foods low in fat every day I would not enjoy eating	39	3.15 ± 1.16 3.64 ± 1.20	-3.14	0.003
	If I ate foods low in fat every day my family would not enjoy eating	39	4.81 ± 2.42 6.00 ± 2.45	-2.81	0.008
OENFV Scale 1=Strongly agree 2= Agree 3= Unsure 4=Disagree 5=Strongly disagree	If I ate 5 servings of fruits & vegetables every day I would have more energy	39	1.90 ± 0.82 1.56 ± 0.60	2.18	0.036
	If I ate 5 servings of fruits & vegetables every day I would not enjoy eating	38	3.61 ± 1.26 4.08 ± 0.94	-2.83	0.008
	If I ate 5 servings of fruits & vegetables every day I would be less likely to get cancer	39	1.87 ± 0.77 1.62 ± 0.59	2.24	0.031
	If I ate 5 servings of fruits & vegetables every day I would be a good example to others	39	1.56 ± 0.64 1.33 ± 0.58	2.69	0.011
LTEQ Self-reported Physical Activity	Moderate exercise/week	37	3.00 ± 2.26 4.35 ± 2.33	-2.22	0.032
	Strenuous exercise/week	37	2.95 ± 2.07 3.95 ± 2.77	-3.20	0.003

Significant at *P= 0.05*
REAP= Rapid Eating Assessment for Patients
WEL= Weight Efficacy Lifestyle Questionnaire
OENLF= Outcome Expectations for Nutrition (Low-Fat)
OENFV= Outcome Expectations for Nutrition (Fruits & Vegetables)
LTEQ = Godin Leisure-Time Exercise Questionnaire
SD= Standard deviation

Table 4. Paired T-test for Pre/post Total Scores in Weight Efficacy Lifestyle Factors/Categories

Factor	Questions/Items	N	Mean ± SD	T	P
Negative Emotions	I can resist eating when I am anxious/ nervous. I can resist eating when I am depressed/ down. I can resist eating when I am angry/ irritable. I can resist eating when I have experienced failure.	36	23.14 ± 7.46 (Pre) 25.36 ± 7.72 (Post)	-2.70	0.011*
Availability	I can control my eating on weekends. I can resist eating when there are many different kinds of food available. I can resist eating even at a party. I can resist eating even when high-calorie foods are available.	37	20.89 ± 7.54 25.36 ± 8.49	-1.75	0.089
Social Pressure	I can resist eating even when I have to say "no" to others. I can resist eating even when I feel it's impolite to refuse a second helping. I can resist eating even when others are pressuring me to eat. I can resist eating even when I think others will be upset if I don't eat.	38	22.73 ± 7.80 24.52 ± 8.46	-2.13	0.040*
Physical Discomfort	I can resist eating when I feel physically run down. I can resist eating even when I have a headache. I can resist eating when I am in pain. I can resist eating when I feel uncomfortable.	39	26.70 ± 7.19 27.51 ± 7.28	-1.08	0.285
Positive Activities	I can resist eating when I am watching TV. I can resist eating when I am reading. I can resist eating just before going to bed. 1 can resist eating when 1 am happy.	39	26.43 ± 7.06 27.40 ± 7.04	-1.31	0.198

* Significant at *P= 0.05*

et al., 1999), outcomes related to breast feeding (Boyd and Windsor, 2003), and improvement in class performance (Sé et al., 2008), the role of the PE seems to have been limited to the implementation phase of interventions. However, one of the major goals of this study was to incorporate PE participation in not only the implementation, but also the curriculum development phase. Feedback from PEs regarding course content, during their training, was considered in revisions made by faculty and graduate assistants. This was done with the intention to increase PE ownership of the lecture and discussion content of the course, and also to allow adoption of key issues important to the target population.

Significant improvement in self-reported weekly strenuous and moderate physical activity in eight weeks was found in the present study as compared to a previous trial in college students (D'Alanzo, 2004) which consisted of two 16-week sessions over two semesters. However, our study was unable to show changes in self-efficacy for exercise behaviors due to the short intervention period and high pre-intervention self-efficacy. This is interesting because the self-reported physical activity improved but the students' overall efficacy for exercise did not change.

One of the major premises of this study was the use of nutrition knowledge as a necessary platform for supporting changes in behavior. This was evident in examining the Rapid Eating Assessment for Patients results which showed improved fruit intake, reduced regular salad dressing, and a reduction in time spent watching television. All these issues except time spent watching television were emphasized in our class content. Nutrition Self-Efficacy scores showed improvement in conditions related to peer pressure and negative emotions. Other studies (Matvienko et al., 2001; Abood et al., 2004) have shown behavioral changes using undergraduate class-based initiatives as well. These positive results reported here could possibly be attributed to the PE-faculty teaching partnership structure of the intervention or the short time period of the study.

Other studies have also used the self-efficacy component of the Social Cognitive Theory to induce behavior changes. One such intervention (Abood et al., 2004) in college female athletes used a self-efficacy-based approach to improve nutrition knowledge and confidence in the ability to make healthful choices. Our study, using PEs, improved self-efficacy associated with resisting eating when students had to say no to others, when physically run down, during depression, and making healthful dietary choices during periods of stress and under pressure from others. In addition, we demonstrated positive and significant increase in mean scores on categories/factors relating to resisting eating when faced with negative emotions and social pressure.

Our results demonstrate some changes in nutritional self-efficacy, outcome expectancies, and behavior within an eight-week period. Although a short-term intervention, the most significant change was the improvement in nutrition expectancies associated with intake of fruits and vegetables and low fat foods. Other significant findings included nutrition self-efficacy associated with resisting eating during depression and under pressure from others. Finally, we saw changes in self-reported strenuous and moderate physical activity per week. Grounding the project in Social Cognitive Theory and using the construct of self-efficacy showed significant impact on self-reported nutrition intake and physical activity.

Regression models generated from the data showed that the variance in post-test Nutrition Self-Efficacy, Self-Efficacy for Exercise, and nutrition behavior (Rapid Eating Assessment for Patients) was largely explained by the pre-test scores in those variables at the beginning of the program (79%, 81%, and 80% respectively). This suggests that self-efficacy and outcome expectations at the conclusion of the study were influenced most by the values for those variables at the beginning of the study. However, some physical activity-related constructs were included in the Rapid Eating Assessment for Patients, and fruit and vegetable-related eating as well as physical activity were included in the Outcome Expectations for Low-Fat models. This suggests that healthy behaviors may sometimes, but not always, reinforce one another.

Limitations

One of the major limitations of the study was the lack of a control group (Cluskey and Grobe, 2009). To remain within the limits of the grant in terms of time and money, a pilot study was designed without a control group, using a pre/post-test assessment of impact. Another limitation was the absence of a post-post evaluation which would have determined how long the changes were maintained after the intervention. The sample in the study was a convenience sample and not ethnically diverse since the recruitment was carried out in the departments of food science, human nutrition, and kinesiology. Marketing the course to students in these fields makes it difficult to generalize the results of the study to the general student population. As with many education interventions, our study also relied on self-reported nutrition and exercise behavior.

Summary

While peer education has been previously used in health-based initiatives, one of the novel achievements of our study was the utilization of PEs in course development, implementation, and evaluation. This comprehensive approach ensured that our class content remained appropriate for the college student target audience. The discussion and lecture format of the class also allowed PEs the opportunity to reinforce basic nutrition and exercise concepts taught by faculty through an activity-based learning style.

Sustainability of a PE driven initiative would rely heavily on the adequate training of PEs and interest among college students. Our study provided a basic PE training model that could be improved in the areas of teaching practice and content specific training. The overwhelming response from students demonstrated interest for topics addressing obesity in college setting.

Impact evaluation showed some significant improvements in nutrition self-efficacy, outcome expectations, and behavior. There was also a significant increase in self-reported moderate and strenuous weekly physical activity over the eight-week intervention period.

Young adulthood can serve as a critical time for establishing health behaviors and the college environment is an optimal venue for an obesity prevention effort. These positive outcomes related to nutrition and physical activity highlight the importance of using the constructs of self-efficacy and outcome expectations as a framework for future studies that tackle the obesity epidemic in the college-aged population.

Literature Cited

Abood, D. A., D. Black, R. Birnbaum. 2004. Nutrition education intervention for college female athletes. Journal of Nutrition Education and Behavior 36(3): 135-139.

Abrams, D.B. and M.J. Follick. 1983. Behavioral weight-loss intervention at the worksite: Feasibility and maintenance. Journal of Consulting and Clinical Psychology 51:226-233.

Amstutz, M., K. Wimbush, and D. Snyder. 2010. Effectiveness and student demographics of peer-led study groups in undergraduate animal science courses. NACTA Journal 54(1): 76-81.

Bandura, A. 1997. Self-efficacy: The exercise of control. New York, NY: W.H. Freeman.

Baranowski, T., M. Davis, K. Resnicow, J. Baranowski, C. Doyle, L.S. Lin, M. Smith, and D.T. Wang. 2000. Gimme 5 fruit, juice, and vegetables for fun and health: Outcome evaluation. Health Education Behavior 27(1): 96-111.

Boyd, N.R. and R.A. Windsor. 2003. A formative evaluation in maternal and child health practice: The partners for life nutrition education program for pregnant women. Maternal and Child Health Journal 7(2): 137-143.

Buller, D.B., C. Morrill, D. Taren, M. Aickin, L. Sennott-Miller, M.K. Buller, L. Larkey, C. Alatorre, and T.M. Wentzel. 1999. Randomized trial testing the effect of peer education at increasing fruit and vegetable intake. Journal of the National Cancer Institute 91(17): 1491-1500.

Center for Disease Control and Prevention. 1997. Update: Prevalence of overweight among children, adolescents, and adults- United States, 1998-1994. MMWR Morb Mortal Rep 46: 199-202.

Clark, M.M., D.B. Abrams, R.S. Niaura, C.A. Eaton, and J.S. Rossi. 1991. Self-efficacy in weight management. Journal of Consulting and Clinical Psychology 59(5): 739-744.

Cluskey, M. and D. Grobe. 2009. College weight gain and behavior transitions: Male and female differences. Journal of the American Dietetic Association 109(2): 325-329.

Cornwall, A. and R. Jewkes. 1995. What is participatory research? Social Science Medicine. Part D, Medical Geography 41(12): 1667-1676.

D'Alonzo, K.T. 2004. Outcomes of a program to enhance exercise self-efficacy and improve fitness in black and Hispanic college-age women. Research in Nursing Health 27(5): 357-369.

Dishman, R.K., R.W. Motl, R. Saunders, G. Felton, D.S. Ward, M. Dowda, and R.R. Pate. 2004. Self-efficacy partially mediates the effect of a school-based physical-activity intervention among adolescent girls. Preventive Medicine 38(5): 628-636.

Fisher, J.D. W.A. Fisher, S.J. Misovich, D.L. Kimble, L. Diane, and T.E. Malloy. 1996. Changing AIDS risk behavior: Effects of an intervention emphasizing AIDS risk reduction information, motivation, and behavioral skills in a college student population. Health Psychology 15(2): 114-123.

Ellis, W.W. 1993. Bonding with freshman. NACTA Journal 37(1): 14-15.

Gans, K.M., E. Ross, C.W. Barner, J. Wylie-Rosett, J. McMurray, and C. Eaton. 2003. REAP and WAVE: New tools to rapidly assess/discuss nutrition with patients. Journal of Nutrition 133(2): 556s-562s.

Godin, G. and R.J. Shephard. 1985. A simple method to assess exercise behavior in the community. Canadian Journal of Applied Sport Sciences 10(3): 141-146.

Gordon-Larsen, P., L.S. Adair, M.C. Nelson, and B.M. Popkin. 2004. Five-year obesity incidence in the transition period between adolescence and adulthood: The national longitudinal study of adolescent health. American Journal of Clinical Nutrition 80(3): 569-575.

Guo, S.S., C. Huang, L.M. Maynard, E. Demerath, B. Towne, W.C. Chumlea, and R.M. Siervogel. 2000. Body mass index during childhood, adolescence and young adulthood in relation to adult overweight and adiposity: The Fels longitudinal study. International Journal of Obesity 24(12): 1628-1635.

Holm-Denoma, J.M., T.E. Joiner, K.D. Vohs, and T.F. Heatherton. 2008. The "Freshman fifteen" (the "Freshman five" actually): Predictors and possible explanations. Health Psychology 27(1 Suppl): S3-S9.

Khan, N., C. Nasti, E.M. Evans, and K. Chapman-Novakofski. 2009. Peer education, exercising, and eating right (PEER): Training of peers in an undergraduate faculty teaching partnership.

Journal of Nutrition Education and Behavior 41(1): 68-70.

Levitsky, D.A., C.A. Halbmaier, and G. Mrdjenovic. 2004. The freshman weight gain: A model for the study of the epidemic of obesity. International Journal of Obesity 28(11): 1435-1442.

Lowry, R., D.A. Galuska, J.E. Fulton, H. Wechsler, L. Kann, and J.L. Collins. 2000. Physical activity, food choice, and weight management goals and practices among U.S. college students. American Journal of Preventive Medicine 18(1): 18-27.

Matvienko, O., D.S. Lewis, and E. Schafer. 2001. A college nutrition science course as an intervention to prevent weight gain in female college freshmen. Journal of Nutrition Education 33(2): 95-101.

McAuley, E. 1993. Self-efficacy and the maintenance of exercise participation in older adults. Journal of Behavioral Medicine 16(1): 103-113.

Mokdad, A.H., M.K. Serdula, W.H. Dietz, B.A. Bowman, J.S. Marks, and J.P. Koplan. 1999. The spread of the obesity epidemic in the United States, 1991-1998. Journal of American Medical Association 282 (16): 1519-1522.

National Institutes of Health, National Heart, Lung, and Blood Institute. 1998. Obesity research. Bethesda, MD 6(2): 51S-209S.

NHLBI Obesity Education Initiative Expert Panel. Clinical guidelines on identification, evaluation, and treatment of overweight and obesity in adults: The Evidence Report.

Racette, S.B., S.S. Deusinger, M.J. Strube, G.R. Highstein, and R.H. Deusinger. 2005. Weight changes, exercise, and dietary patterns during freshman and sophomore years of college. Journal of American College Health 53(6): 245-251.

Sé, A.B., R.M. Passos, A.H. Ono, and M. Hermes-Lima. 2008. The use of multiple tools for teaching medical biochemistry. Advances in Psychology Education 32: 38-46.

Steinhardt, M. and R.K. Dishman. 1989. Reliability and validity of expected outcomes and barriers for habitual physical activity. Journal of Occupational Medicine 31: 536-546.

Tussing L. and K. Chapman-Novakofski. 2005. Osteoporosis prevention education: Behavior theories and calcium intake. Journal of American Dietetic Association 105(1): 92-97.

United Nations Interagency Group on Young People's Health, Development and Protection in Europe and Central Asia, Sub-Committee on Peer Education. Peer Education: Training of Trainers Manual. 2003. http://www.aidsmark.org/ipc_en/pdf/sm/tm/Peer%20Education%20Training%20of%20Trainers%20Manual.pdf . Accessed July 8, 2008.

Wechsler, H., K. Kelley, M. Seibring, M. Kuo, and N.A. Rigotti. 2001. College smoking policies and smoking cessation programs: Results of a survey of college health center directors. Journal of American College Health 49(5): 205-212.

White, S. Y.S. Park, T. Israel, and E.D. Cordero. 2009. Longitudinal evaluation of peer health education on a college campus: Impact on health behaviors. Journal of American College Health 57(5): 497-506.

Student Farms at United States Colleges and Universities: Insights Gained from a Survey of the Farm Managers

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Abstract

Student farms at United States colleges and universities enhance curricula by integrating research, extension and teaching missions, reinforcing classroom instruction, and improving job training. Student farms are sites of agricultural production and marketing at which students have, through coursework and/or internships, opportunities to supplement classroom instruction with "real world" experience. Student farms and their influence on curricula began decades ago, but the number of farms and their impact have increased recently. Although increasingly numerous, the structure, programming, and operating principles of student farms have not been studied. A lack of knowledge regarding student farms hinders the development of new farms and ongoing success of existing farms. Therefore, an online survey of student farm managers was distributed in order to gain insights into the current status of student farms in the United States.

The data were used to determine that college and university student farms are diverse in operating characteristics. Though many groups contribute to successful farm operation, undergraduate students are the largest group to participate in and benefit from student farms. Working with a limited budget was the most significant challenge faced, though despite various challenges, farm managers on average, reported that their farms were operating successfully. Managers also indicated that their farm played a role in attracting students to attend their college or university.

Introduction

"The land grant institution was created under the Morrill Act with the purpose of, among other things, …teaching such branches of learning as are related to agriculture…"(Collier, 2002, p. 182). College and university student farms have been present on campuses throughout the United States for the duration of the passing of the Morrill Act. Student farms vary greatly in size and focus, but a common philosophy is their role in providing students with opportunities to gain valuable skills through applied experiences. In addition to acquiring various skills, involvement with a student farm allows students a concrete medium in which to solidify knowledge gained through coursework. Student farms currently operating across the United States offer a wide range of learning opportunities through which students can gain experience to supplement coursework, major programs and certificate programs, and provide opportunities for internships and volunteering.

The educational basis for inclusion of student farm opportunities in curricula is grounded on the idea that these opportunities serve as a form of experiential education. Stated simply, experiential education is learning by doing (Andreasen, 2004), and the basis of this type of education rests upon a foundation of four pillars, including learning in real-life contexts, learning by doing, learning through projects, and learning by solving problems. The essence of experiential education is that of engaging students to "solve problems inductively, actively use and explain knowledge through solving problems, and make connections and apply knowledge beyond the classroom and school, based on real-life problems" (Knobloch, 2003, p. 23).

John Dewey's name is associated with the term experiential education (Knobloch, 2003), and was an early proponent of this educational model. According to Dewey, "Education, in order to accomplish its ends both for the individual learner and for society must be based upon experience" (Dewey, 1938, p. 89). Many others serve as strong proponents of the experiential education model (Mak, 1992; McKeachie, 1999; Saddington, 1992). Thus, calls to incorporate experience-based learning into the curriculum in higher education have been widespread (Boyer Commission, 1998; National Leadership Council for Liberal Education & America's Promise, 2007; U.S. Department of Labor, 1991).

Recommendations to shift agricultural curricula to an experiential learning model, grounded in real-life situations and problems (Francis et al., 2001; Knobloch, 2003) and specifically to incorporate farm-based experiences (Parr et al., 2007; Steiner and Vogel, 2005; Trexler et al., 2006), have been made by many. From very early years, student farms provided an excellent medium in which to present problem material to students (Murray, 1945). Consequently, various studies lend support to the inclusion of student farms in college curricula. For example, a survey of College of Agriculture Academic Associate Deans identified the importance of providing hands-

on learning experiences as equally important with traditional teaching methods. In addition, findings from the study revealed that experiential learning and lecture tied as the most important practices used for teaching (Fields et al., 2003).

Benefits offered to students involved with student farms included the chance to develop a vast array of abilities, including critical thinking, decision making (Steiner and Vogel, 2005), problem solving (Trede et al., 1992), application of knowledge (Murray, 1945; Steiner and Vogel, 2005), sense of responsibility, leadership skills (Hillers, 1983), management skills (Murray, 1945), motivation, work ethic (Knobloch, 2003), and building of interpersonal relationships (Hillers, 1983; Trede et al., 1992). These abilities are crucial in the job market, as employers seek potential employees skilled in problem solving, critical and analytic thinking (Gordon, 1976), adaptability, effective communication, and ability to work as a member of a team (Washer, 2007), in addition to a practical background in agriculture (Mayer, 1980).

A changing student population provides additional support for the development of student farms, where students lacking practical knowledge can gain hands-on experience. Students enrolled in agriculture courses come increasingly from urban and nonfarm backgrounds and therefore, lack practical knowledge in agriculture (Dyer et al., 1999; Mayer, 1980; Scofield, 1995). Because these students lack practical knowledge, emphasis must be placed on including experience-based opportunities in curricula in order to properly prepare students for careers in agriculture.

In addition to the benefits students receive, student farms offer varied benefits to the colleges and universities at which they are located. One major benefit is the potential of attracting students to attend the college or university, or attracting students to pursue agricultural courses and majors. The student farm at North Carolina State University serves as an example of the potential that student farms offer in attracting students. The NCSU farm attracts involvement from a wide range of participants including students from a variety of disciplines, 63% from outside of North Carolina, 11% internationally, and 56% of who have had no agriculture or related training (Schroeder et al., 2006). At a time when attracting students into traditional agriculture programs is becoming increasingly difficult (Campbell et al., 2003), attraction to school farms is of tremendous importance.

Problem, Purpose, and Objectives

Though student farms have served a role in higher education for over a century, in recent years, development of these farms has increased significantly. Since 1990, at least 41 student farms have been established in the United States (The New Farm website, www.newfarm.org/depts/student-farm/directory.shtml) that met the following definition of student farms that was used in this study:

Puts students to work in ways that teach them about crop production as well as direct marketing. All work—from planning to harvesting—is done by students. The farm demonstrates basic plant and animal husbandry, professional cultivation methods, integrated pest management and research. (Holzhueter, 2006, p.1)

*With such strong in*terest in the development of these farms, research designed to gain a better understanding of the status of currently operating farms is imperative. In addition to providing valuable information to schools aiming to establish a student farm, this research will benefit farms currently in operation that are looking to learn from the experiences of others. Therefore, the purpose of this study was to describe the current status of student farms at colleges and universities in the United States, from the perspective of the farm managers.

Objectives guiding the study included describing farm managers' perceptions of:

1. demographics of student farms
2. participants and their roles at student farms
3. programming and operations of student farms

Methods

Subject Selection

This study was conducted as a census of student farm managers at colleges and universities in the United States. Potential subjects were included on The New Farm website's Farming for Credit Directory, which lists college and university hands-on agricultural education opportunities. The list, including 79 college and university student farms, was obtained from http://www.newfarm.org/depts/student-farm/directory.shtml on February 19, 2008. Through searching university, college, and student farm websites, and through making personal phone calls, a manager for each farm was identified. In the case that a farm lacked a designated manager, the person referred to as manager was the faculty, staff, or student leader overseeing farm operations. Through making these contacts, in nine cases it was verified that student farms were not in operation, and therefore these schools were removed from the list.

To broaden the frame to include farms not listed on The New Farm website, various collection techniques yielded 70 farm managers who were sent an email requesting a list of five student farms at colleges or universities in the United States. Responses were added to the original list and duplicates deleted. Multiple farms operating on separate campuses within a college or university were included individually on the list. Ten previously unidentified student farms were discovered through this method, whose managers were then verified. These techniques yielded 80 college and university student farms whose managers served as the frame for this study.

Instrument Design

The researcher-designed questionnaire included four sections containing 36 quantitative and qualitative items designed to gain a better understanding of the current status of college and university student farms in the United States. The four sections focused on student involvement, programming, operating characteristics, and farm demographics. Content and face validity were established by a review from a panel of experts in Horticulture and Crop Science and Social Science.

Survey Implementation

Data were collected using Dillman's (2000) tailored design method. One week prior to survey launch, a handwritten postcard was hard-mailed informing subjects that notice of an electronic survey would be arriving in their email accounts the following week. On April 17, 2008, an email was dispersed to the target population detailing instructions for survey completion. ZoomerangTM online survey was used to administer the survey. The survey remained accessible through April 29, during which time non-respondents received two thank you/reminder emails encouraging them to complete the questionnaire.

Statistical Analysis

Data were analyzed using SPSS version XVI. Appropriate descriptive statistics including percentages, means, medians, modes, and standard deviations were used to describe the accessible population of student farms at colleges and universities in the United States.

Results and Discussion

Of the 80 potential subjects receiving a survey invitation, 50 responses were received for a response rate of 62.5%. The majority of farms participating in the study were located at land grant universities (37%) or liberal arts colleges (37%), while some were located at non-land grant universities (15.2%), community colleges (8.7%), and technical colleges (2.2%). Geographically, farms were located primarily in the eastern United States and on the west coast (see Figure 1). The majority of colleges and universities at which these farms were located offered courses (85.1%) and major programs (59.6%) in agriculture. Apparently, benefits of student farms are still offered at institutions not offering any courses in agriculture, since a few farms are currently in operation at these locations.

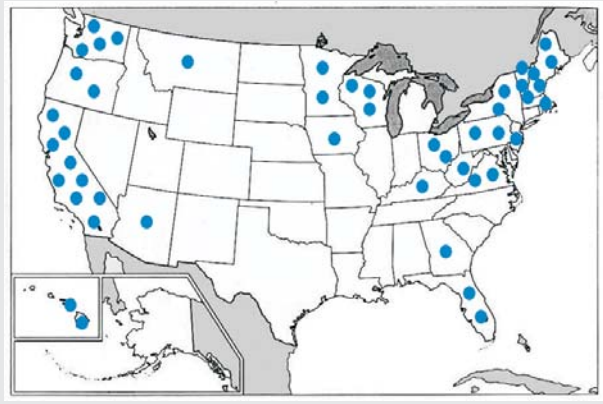

Figure 1. Location of U.S. college and university student farms participating in the study

Average farm size exhibited bimodal distribution, with the majority of farms being 0-4 acres (43.5%) or over 50 acres (30.4%). Principles on which farms operated included organic (77.8%), sustainable (62.2%), and traditional (28.9%). These results reflect that certain farms are operating using more than one of the principles listed. While a large percentage of farms were established prior to 1979 (38.3%), the majority have been established since 1990 (59.5%), with 10.6% established from 1990-1994, 17% established from 1995-1999, 17% established from 2000-2004, and 14.9% in 2005 or later (see Table 1). If this

Table 1. Year of Establishment of College and University Student Farms in the United States

Year farm was established	f*	%
Prior to 1979	18	38.3
1980-1984	1	2.1
1985-1989	0	0
1990-1994	5	10.6
1995-1999	8	17
2000-2004	8	17
2005 or later	7	14.9

*(n=47)

Table 2. Level of Involvement and Importance of Involvement of Various Groups Involved in U.S. College and University Student Farm Operations

	Labor provided by %*	Level of involvement**	Importance of involvement***
Undergraduate students	64	Very involved	Extremely important
Graduate students		Slightly involved	Slightly important
Faculty	19	Moderately involved	Very important
Staff	12	Moderately involved	Very important
Volunteers	8	Slightly involved	Moderately important
Administrators	1	Slightly involved	Moderately important
Alumni	1	Not involved	Slightly important
Industry persons	1	Not involved	Slightly important

*Totals over 100% due to respondent error.
**Scale: 1 = not involved, 2 = slightly involved, 3 = moderately involved, 4 = very involved, 5 = extremely involved
***Scale: 1 = not important, 2 = slightly important, 3 = moderately important, 4 = very important, 5 = extremely important

trend continues, many more student farms will continue to be formed across the U.S. in coming years.

As can be seen in Table 2, student farms reported a mean involvement of 60-69 students (sd, 5.71) annually, who represented 7-8 different majors. Of the students involved in the farms, a mean of 88% (sd, 1.85) were undergraduates while 48% (sd, 3.29) were agriculture majors. Students were driven to be involved with farms due to course requirements (mean, 37%; sd, 3.39), membership in a student organization (mean, 37%; sd, 3.58), volunteering (mean, 35%; sd, 3.14), work study (mean, 23%; sd, 2.93), internships (mean, 18%; sd, 1.95), and research projects (mean, 14%; sd, 1.58). In return for their involvement, 36% (sd, 3.26) received course credit, 35% (sd, 3.12) received pay, and 16% (sd, 2.22) received work study credit.

Students performed a range of farm responsibilities providing, on average, 64% (sd, 2.47) of farm labor, 52% (sd, 3.34) of student training, 50% (sd, 3.41) of implementing new projects and initiatives, 43% (sd, 3.55) of management decision making, 42% (sd, 3.73) of financial recordkeeping, 42% (sd, 3.91) of marketing products, and 40% (sd, 3.63) of worker supervision.

Though these are 'student' farms, the importance of involvement from other parties was clear in the survey results. A mean of four faculty (sd, 3.29), and three staff (sd, 3.22) were involved in each student farm annually (see Table 2). While students provided the majority of labor, faculty, staff and volunteers also provided substantial work effort, providing 19%, 12%, and 8% of the work effort respectively. Farm managers evaluated undergraduate students as being very involved, faculty and staff as moderately involved and graduate students, volunteers, and administrators as slightly involved. Regarding the importance of group involvement, managers perceived undergraduate student involvement to be extremely important, faculty and staff involvement as very important, volunteer and administrator involvement as moderately important, while the involvement of graduate students, alumni, and industry persons was perceived to be slightly important.

According to farm managers, undergraduate students received great value from the student farm, while departments, colleges, and communities received significant value. According to farm managers, faculty and universities received moderate value, while graduate students and the industry received slight value. It is important to note that students are not the only group receiving benefit from the efforts of operating a student farm.

Student farms were associated with various programs and organizations on the campuses on which they were located (see Table 3). The highest percentage of farms were associated with a program in organic or sustainable agriculture (80%). A large majority of farms were also associated with horticulture and crop science programs (76.2%), and student

Level of association	Agriculture		Horticulture, Crop Science, Plant Science, or Related Area		Animal Science		Organic or Sustainable Agriculture or Related Area		Environmental Studies		Work study program		Student organization		Campus initiative associated with sustainability	
	f****	%	f*****	%	f*******	%	f*	%	f**	%	f********	%	f*********	%	f**********	%
Not associated	5	12.2	5	11.9	14	36.8	4	8.9	12	27.9	13	33.3	9	22.5	10	25
Slightly associated	7	17.1	13	31	6	15.8	6	13.3	13	30.2	12	30.8	10	25	12	30
Moderately associated	6	14.6	6	14.3	3	7.9	7	15.6	9	20.9	6	15.4	7	17.5	13	32.5
Strongly associated	17	41.5	13	31	7	18.4	23	51.1	7	16.3	5	12.8	13	32.5	2	5
Not applicable	6	14.6	5	11.9	8	21.1	5	11.1	2	4.7	3	7.7	1	2.5	3	7.5

*(n=45)
**(n=43)
***(n=42)
****(n=41)
*****(n=40)
******(n=39)
*******(n=38)

Table 3. Level of Association of Various Programs with College and University Student Farms in the United States

Table 4. Production Focus of College and University Student Farms in the United States

Production focus	% of farms producing	Average % of operation
Horses	17	5
Dairy cattle	10.6	5
Beef cattle	17.0	4
Swine	12.8	2
Sheep	17.0	3
Goats	4.3	0
Poultry	14.9	1
Grains	12.8	1
Forages	21.3	5
Vegetable crops	89.4	58
Fruit crops	61.7	10
Forestry crops	12.8	1
Nursery or greenhouse plants	31.9	4
Other	23.4	3

Table 5. Funding Sources for Initial Development and Current Operation of College and University Student Farms in the United States

	Initial development		Current operations	
	Mean %	Std. dev.	Mean %	Std. dev.
Farm product sales	----------	----------	29	3.31
College	30	3.68	23	3.56
University	17	3.05	14	3.08
Grant	17	2.73	6	1.23
Department	9	1.91	11	1.97
Program	9	2.54	9	2.38
Students	6	1.43	5	1.72
Industry donations	5	1.78	4	1.57
Community Donations	5	1.32	2	
Alumni donations	4	.93	3	1.20
Faculty	4	.93	2	.50
Sustainability initiative	3	.98	2	.56
Campus dining services	2	.63	3	.95

organizations (75%). These associations with programs and organizations likely help to ensure the presence of enough labor to keep the farms in operation.

Regarding programming offered by student farms, the majority of farms responding to the survey offered volunteering (85.7%), courses (77.6%), community activities (77.6%), internships (71.4%), field days (67.3%), and research projects (65.3%) as examples of programming efforts lesser percentages of farms offered programs in academic majors (38.8%), certificate programs (22.4%), and adult education (20.4%) in association with the farm. On average, five courses were taught in association with each farm, and students enrolled in these courses visited the farm 6-7 times during undergraduate enrollment.

Though production focus varied greatly among farms (see Table 4), vegetable production was clearly most common, with 89.4% of farms producing vegetables which made up an average of 58% of each farm operation. Fruit crops were produced by 61.7% of farms (average 10% of operation), while farms also produced nursery or greenhouse plants (31.9%), forages (21.3%), sheep (17%), beef cattle (17%), and horses (17%). Production of multiple animal species and/or types of crops allows students greater learning opportunities than if producing a single crop or species of livestock.

Average annual operating budget for farms varied greatly from under $5,000 to over $125,000, (mean, $50,001-$55,000; sd, 9.98). Funding for both initial development and current operation of farms came from a variety of sources (see Table 5). College funds most commonly supported development of farms, providing an average of 30% of start-up costs, while universities (17%) and grants (17%) provided funding for development. Current operating costs derived most commonly from farm product sales (29%), colleges (23%), universities (14%) and departments (11%).

Various challenges were faced in operating student farms (see Table 6). Working with a limited budget was rated as most difficult, while gaining administrator support was considered challenging. Gaining faculty involvement and student interest were moderate challenges.

Student farm managers evaluated current operation of their student farm as extremely successful (8.5%), very successful (40.4%), moderately successful (44.7%), and slightly successful (6.4%). In addition, managers agreed their student farm played a role in attracting students to attend their college or university (see Table 7). Managers neither agreed nor disagree the farm served a role in attracting students from outside their state, while disagreement was expressed regarding the role the farm played in attracting students from outside the United States.

Table 6. Level of Challenge Posed by Various Factors in Operating College and University Student Farms in the United States

Student farm challenges	Working with a limited budget		Gaining student interest		Gaining faculty involvement		Gaining administrator support		Gaining community support	
	f*	%	f*	%	f**	%	f**	%	f***	%
No challenge	2	4.3	9	19.1	3	6.5	2	4.3	10	22.7
Slight challenge	5	10.6	17	36.2	8	17.4	7	15.2	19	43.2
Moderate challenge	14	29.8	10	21.3	15	32.6	15	32.6	13	29.5
Significant challenge	9	19.1	6	12.8	14	30.4	10	21.7	2	4.5
Great challenge	17	36.2	5	10.6	6	13	12	26.1	0	0
Mean	3.72		2.60		3.26		3.50		2.16	
Std. dev.	1.19		1.25		1.10		1.17		.83	

Scale ranged from 1 = no challenge to 5 = great challenge
*(n=47)
**(n=46)
***(n=44)

Table 7. United States College and University Student Farm Managers' Perceptions of the Role Played by Student Farms in Attracting Students from Various Locations to Attend a College or University

Role played by student farm in attracting students	To attend my college or university		From outside of the state		From outside of the United States	
	f*	%	f**	%	f***	%
Strongly disagree	4	8.3	8	17	18	39.1
Moderately disagree	4	8.3	3	6.4	10	21.7
Slightly disagree	0	0	5	10.6	4	8.7
Slightly agree	14	29.2	13	27.7	6	13
Moderately agree	13	27.1	10	21.3	1	2.2
Strongly agree	12	25	5	10.6	3	6.5
Not applicable	1	2.1	3	6.4	4	8.7
Mean*	4.27		3.43		2.11	
Standard deviation	1.63		1.81		1.62	

Conclusions

Student farms are currently serving important roles in a range of educational settings, especially at institutions lacking major programs and courses in agriculture. Because a diverse audience of students can benefit from involvement, student farm opportunities should be available to all students, especially those studying agriculture. A variety of programming options offers the potential to attract involvement from the greatest number of students, as well as greatest benefit to those involved. Hands-on experience, the opportunity most commonly offered to students in farm courses and internships, is a component lacking in most college courses (Ewing and Whittington, 2009), and therefore these real-life opportunities for skill-development and application of knowledge through involvement with student farms are extremely valuable and serve as an important supplement to classroom-based instruction.

Involvement of various groups is clearly needed for successful operation of student farms. Students are providing the majority of the work effort, yet for learning opportunities to be most effective, assistance from knowledgeable faculty and staff members is necessary, and therefore finding faculty and staff willing to assist with such an operation is crucial.

While student farms were commonly associated with sustainable and organic agriculture programs and courses, valuable learning opportunities exist, and should be offered, in a variety of disciplines. The greatest proportion of farms operated using organic principles, yet operating on varied principles potentially offers the greatest educational experience by allowing students to compare and contrast differing production practices.

Benefits of student farms extend beyond simply helping students (Holzhueter, 2006). Universities, colleges, departments, faculty, and communities also received substantial benefit, and these factors need to be considered in making decisions regarding support and resources devoted to student farms. It also needs to be promoted heavily when searching for potential funding sources. One potential benefit of great importance is the student farm's ability to attract students to attend a college or university. This characteristic needs to be capitalized upon by promoting the work of the farm and opportunities for involvement in various settings, including the recruitment of students.

As discussed above, recommendations to shift agricultural curricula to an experiential learning model, grounded in real-life situations and problems (Francis et al., 2001; Knobloch, 2003) and specifically to incorporate farm-based experiences (Parr et al., 2007; Steiner and Vogel, 2005; Trexler et al., 2006), have been made by many. If this is the case, and if the resources are available for student farms to exist, which they clearly are, why isn't a student farm in operation at every institution offering courses in agriculture? More research is needed to answer this question, as well as others. Understanding the farm operations in more detail, and the specific benefits and learning experiences offered to students is important. Studying the details of funding sources and the factors contributing to success of each individual farm would also allow other farms to improve their operations, and possibly more farms to be established.

Regardless of their size, budget, or the number of students involved, in general student farms are operating successfully across the United States. By continuing research and creating networking opportunities for those involved with student farms, farm success will be promoted and development of new farms facilitated. Through this, experiential learning will be increased and student learning will be maximized as students gain first-hand experiences in which they are able to gain valuable knowledge and skills.

Literature Cited

Andreasen, R.J. 2004. Integrating experiential learning into college of agriculture capstone courses: Implications and applications for practitioners. NACTA Journal 48(1): 52-57.

Boyer Commission on Educating Undergraduates in the Research University. 1998. Reinventing undergraduate education: A blueprint for America's research universities. http://naples.cc.sunysb.edu/pres/boyer.nsf/. Accessed April 30, 2008.

Campbell B.J., D. McConnell, M. Kane, and G. Miller. 2003. Development and implementation of a Non-majors horticultural survey class. HortTechnology 13(1): 196-199.

Collier, J. 2002. Scripting the radical critique of science: The Morrill Act and the American Land-Grant University. Futures 34(2): 182-191.

Dewey, J. 1938. Experience and education. New York, NY: Collier Books.

Dilmann, D.A. 2000. Mail and internet surveys: The tailored design method. 2nd ed. New York, NY: John Wiley & Sons, Inc.

Dyer, J.E., L.M. Breja, R.J. Andreasen. 1999. Attitudes of college of agriculture freshman toward agriculture. Journal of Agricultural Education 40(2): 1-10.

Ewing, J.C. and M.S. Whittington. 2009. Describing the cognitive level of professor discourse and student cognition during college of agriculture class sessions. Journal of Agricultural Education 50(3): electronic.

Fields, A.M., E. Hoiberg, and M. Othman. 2003. Changes in colleges of agriculture at land-grant institutions. NACTA Journal 47: 7-15.

Francis, C.A., G. Lieblein, J. Helenius, L. Salomonsson, H. Olsen, and J. Porter. 2001. Challenges in designing ecological agriculture education: A Nordic perspective on change. American Journal of Alternative Agriculture 16(2): 89-95.

Gordon, S.C. 1976. Campus and workplace as arenas. In: Keeton, M.T. (ed.), Experiential Learning. Washington: Jossey-Bass Publishers.

Hillers, J.K. 1983. On-campus intern program in dairy cattle management. Journal of Dairy Science 66: 1810-1812.

Holzhueter, K. 2006. Farmers enter town's economy through weekly market, cooperative venture and a supportive brewpub. Slippery Rock University, Slippery Rock, PA: The Macoskey Center for Sustainable Systems Education and Research.

Knobloch, N.A. 2003. Is experiential learning authentic? Journal of Agricultural Education 44(4): 22-34.

Mak, W.M. 1992. Experiential learning: The Confucian model. In: Mulligan, J. and C. Griffin (eds.). Empowerment through Experiential Learning: Explorations of good practice. London, ENG: Kogan Page.

Mayer, L.A., 1980. Providing practical training for non-farm agriculture students. NACTA Journal 24(2): 34-35.

McKeachie, W.J. 1999. McKeachie's teaching tips: Strategies, research, and theory for college and university teachers. New York, NY: Houghton Mifflin Company.

Murray, W.G. 1945. Student operation of a laboratory farm. Journal of Farm Economics 27(1): 185-195.

National Leadership Council for Liberal Education and America's Promise. 2007. College learning for the new global century. Washington, D.C.: Association of American Colleges and Universities.

Parr, D.M., C.J. Trexler, N.R. Khanna, and B.T. Battisti. 2007. Designing sustainable agriculture education: Academics' suggestions for an undergraduate curriculum at a land grant university. Agriculture and Human Values, 24: 523-533.

Saddington, J.A. 1992. Learner experience: A rich resource for learning. In: Mulligan, J. and C. Griffin (eds.). Empowerment through Experiential Learning: Explorations of good practice. London, ENG: Kogan Page.

Schroeder, M.S., N.G. Creamer, H.M. Linker, J.P. Mueller, and P. Rzewnicki. 2006. Interdisciplinary and multilevel approach to organic and sustainable agriculture education at North Carolina State University. Hort Technology 16(3): 418-426.

Scofield, G.G. 1995. College of agriculture new student profile. In: Proc. 49th Annu. Mtg. Central Region Research Conference in Agricultural Education, St. Louis, Missouri, 2-4 March.

Steiner, C.R., and G. Vogel. 2005. Internationalizing the AG 450 experience: Student farm Managers. In: Proc. 21st Annual Conference of the Association for International Agricultural and Extension Education Annual Conference. San Antonio, TX.

The New Farm. Farming for credit directory. http://www.newfarm.org/depts/studentfarm/directory.shtml Accessed January 18, 2008.

Trede, L.D., F.M. Soomro, and D.L.Williams. 1992. Laboratory farm-based course meets content and teaching procedures. NACTA Journal 36(4): 21-24.

Trexler, C.J., D.M. Parr, and N. Khanna. 2006. A Delphi study of agricultural practitioners' opinions: Necessary experiences for inclusion in an undergraduate sustainable agricultural major. Journal of Agricultural Education 47(4): 15-24.

United States Department of Labor: The Secretary's Commission on Achieving Necessary Skills. 1991. What work requires of schools: A SCANS report for America 2000. Washington D.C.: U.S. Government Printing Office.

Washer, P. 2007. Revisiting key skills: A practical framework for higher education. Quality in Higher Education 13(1): 57-67.

Student Evaluation Scores for Courses Delivered by Interactive Videoconferencing

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Abstract

The College of Agricultural and Life Sciences offers several baccalaureate degree programs outside of its main campus in Gainesville using a combination of live and distance delivery. The primary means of distance delivery has been interactive videoconferencing (IVC), where a live class is delivered synchronously to one or more remote sites. Instructors were concerned that scores on student evaluations were lower at remote than live sites, although only anecdotal information was available to support this concern. This study compared student evaluation scores between live and remote sites in a sample of 22 courses offered between summer 2005 and spring 2008. Live section scores were compared to scores from all remote sections combined using a Wilcoxan Signed Rank test on the differences between Likert scale scores (1=poor, 5=excellent) on an 11-question student evaluation. Results showed that live section scores were higher than the remote sections 64-86% of the time, depending on the question, and for 10 of 11 questions the differences were statistically significant ($P<.05$). This included the overall ratings of the instructor and the course, which are used to document teaching performance in faculty evaluations. Differences between scores for live and remote sections ranged from 0.18 to 0.47, depending on the question. The data suggest that students receiving instruction at remote sites via IVC are less satisfied than students at live sites, supporting the concerns of faculty. However, remote site scores were at most 0.15 points below typical college means, and live site scores were above college means, suggesting that IVC courses are rated satisfactorily relative to other courses in the College.

Introduction

Distance education (DE) is growing at a rate more than 10 times that of traditional higher education (Allen and Seaman, 2009). More than 25% of all students enrolled in higher education have taken at least one course via distance. In 2010, the University of Phoenix, which delivers much of its courses and programs online, became the second largest university system in the United States despite charging double the average tuition of public universities (Wilson, 2010). Many public universities are responding to the increased demand by increasing DE course and program offerings, but at this time there is no consensus on the technology or approach that provides the best experience for students and faculty. The number of delivery platforms available and associated learning curves can be daunting for faculty tasked with teaching DE courses. Delivery platforms for DE courses are generally divided into synchronous and asynchronous categories, with asynchronous, internet-based platforms being the most common in higher education in the United States (Parsad and Lewis, 2008). Asynchronous delivery has its roots in correspondence courses, where instructors and students interacted via mailed materials. Synchronous delivery originates from the "extended classroom" model adopted in the 1940s where closed-circuit television was used to connect additional rooms to the main lecture hall to provide additional capacity (Bernard et al., 2004). Today, synchronous delivery has evolved largely into interactive videoconferencing (IVC) or live streaming video on the internet. Among the advantages and disadvantages commonly cited, asynchronous delivery allows greater flexibility for students but often less interaction with the instructor, while the opposite is said of synchronous delivery. Asynchronous may be more demanding on the instructor due to high inputs of time and resources for course development and different pedagogical requirements (Seaman, 2009). On the other hand, synchronous delivery methods such as IVC can be relatively transparent to the instructor and therefore preferred by faculty over asynchronous, internet-based platforms (Thornsbury and Griffin, 2002).

The College of Agricultural and Life Sciences (CALS) at the University of Florida has been engaged in a number of degree completion or "2+2" programs outside of its main campus in Gainesville for several years. The programs are housed at Research and Education Centers located in Ft Lauderdale, Ft Pierce, Apopka, Plant City, and Milton, Florida. Eight majors are offered at one or more of these locations by deploying less than 18 teaching FTE off the main campus, thus there is a great need for course sharing among locations. DE delivery began asynchronously by videotaping courses at the originating site and

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sending tapes to students at remote locations. This evolved into synchronous delivery as IVC systems became more affordable and were installed at Research and Education Centers and in Gainesville. While some faculty continue to teach live or have developed asynchronous, internet-based courses, several courses are delivered via IVC each semester.

The use of IVC in CALS has been problematic. Courses are generally taught in the evenings to accommodate the schedules of working students. After normal work hours, technical staff is not available to resolve issues with connectivity and audio and/or video to some sites can be "dropped," resulting in delays in teaching for all sites, or at worst, the complete loss of a class meeting. Courses meet only once per week to minimize commuting, thus the loss of a single meeting represents a substantial amount of the course. A study by McKenney et al. (2010) supports this observation, as administrative time requirements (i.e., non-teaching activities necessary for course delivery) for IVC were double those of face-to-face or online horticulture courses. IVC systems are fairly consumptive of bandwidth, and faculty at Research and Education Centers have noted reduced speed in email and internet applications during IVC course transmission or reception. Faculty have been disappointed with the resolution of IVC systems and contend that their PowerPoint slides or whiteboard content appears washed out or illegible at remote sites.

Given the problematic nature of IVC, it is not surprising that faculty believe student evaluations of their teaching are negatively affected by IVC delivery. This has been documented previously. Chisolm et al. (2000) found numerically lower evaluation scores from students at remote sites compared to students at the live (originating) site for pharmacy courses delivered by IVC. Few of the differences were statistically lower, however. Alternatively, Clow (1999) reported statistically lower student evaluations from students at remote IVC sites for 75% of questions about the instructor. Lower scores were seen for videoconferencing groups than live groups even for questions such as fairness in grading and clarity of course objectives, which should not have been a function of delivery method. More frequently, however, studies have shown no effect or mixed effects of IVC on student evaluations. Spooner et al. (1999) reviewed 11 studies conducted prior to 1999 and found that six showed no differences in student evaluations between live and remote IVC sites, three showed IVC worse than live, and two showed IVC better than live instruction.

The objectives of this study were to determine if student evaluation scores differed at live and remote IVC sites in CALS, and if so, determine if the magnitude of the difference was large enough to 1) affect faculty in terms of annual performance evaluations, and 2) warrant a change in DE delivery technology.

Materials and Methods

Study sample. A convenience sample of student evaluations was used for the study. Student evaluation summaries for courses taught using IVC during 2005-2008 were examined for cases where there were sufficient evaluations from live and remote site(s) to allow for statistical analysis. Courses selected were taught primarily via IVC, although in most cases a course web site was used for items such as posting grades, assignment submission, and supplemental course material. The independent variable was location, live or remote, and there were one to four remote sites, depending on the course. A weighted mean evaluation score was calculated for the remote variable since there were different numbers of students at each remote site. Courses that had at least two completed evaluations returned from each of the live and remote sites were included in the analysis. Courses had relatively small numbers of students and therefore usable evaluations; live sites had 2 to 21 respondents and remote sites had 2 to 12 respondents (each) from which to derive means.

Application of these criteria resulted in 22 cases to analyze. Course subjects included Agribusiness Management, Agricultural Finance, Agricultural and Natural Resource Policy, Marketing, Ornamental Horticulture, Soil Science, Plant Physiology, and Pest Management. Ten different instructors across four

Table 1. Student Evaluation Instrument Questions and Corresponding Ratings, Differences in Ratings between Live and Remote Site Students, P Values and the Percentage of Cases Where Live Site Scores Exceeded Remote Site Scores

Question	Live mean[z]	Remote mean[z]	Difference (Live–Remote)	P value, Wilcoxan signed rank test on differences	% Live > Remote
1. Description of course objectives and assignments	4.50	4.16	.34	.0070	77
2. Communication of ideas and information	4.52	4.15	.37	.0239	64
3. Expression of expectations for performance in this class	4.56	4.17	.39	.0064	68
4. Availability to assist students in or out of class	4.56	4.09	.47	.0136	77
5. Respect and concern for students	4.69	4.33	.36	.0383	64
6. Stimulation of interest in course	4.52	4.18	.34	.0106	68
7. Facilitation of learning	4.55	4.13	.42	.0047	86
8. Enthusiasm for the subject	4.73	4.50	.23	.0101	64
9. Encouragement of independent, creative, and critical thinking	4.48	4.30	.18	.1450	68
10. Overall rating of instructor	4.59	4.28	.31	.0229	68
11. Overall, I rate this course as:	4.44	4.01	.43	.0130	73

[z] Mean ratings were derived from Likert scale responses with 1=poor, 2=below average, 3=average, 4=above average, and 5=excellent.

sites were represented in the sample. Fourteen different courses were represented in the sample; one course was included three times and six courses were included twice (separate years).

Student evaluation instrument. Identical evaluations were distributed to students in all courses, sites and years. Within a course, separate section numbers allowed the determination of whether the data originated from a live or a remote site. The 11 questions were scored on a 5-point Likert scale with 1=poor, 2=below average, 3=average, 4=above average, and 5=excellent. The questions are presented in Table 1.

Statistical analysis. The data were not normally distributed, so a non-parametric Wilcoxan signed rank test was used to analyze the data. The analysis was performed on the difference between the means for live and remote sites within a given course. The null hypothesis was that the difference between evaluation scores for live and remote sites was zero.

Results

The results showed that scores for 10 of the 11 questions on the course evaluations were statistically lower for remote sites than live sites (Table 1). Only "Encouragement of independent, creative, and critical thinking" was scored equally by live and remote site students. In CALS, mean scores for all questions from student evaluations are included in promotion and tenure dossiers, but means from two questions appear in a summary table and are highlighted: the overall rating of instructor and the overall course rating (Questions 10 and 11, respectively). These are presented alongside departmental and college means for comparative purposes. Both were statistically lower for remote than live sites. Students at remote sites gave numerically lower scores to instructors than live site students 64-86% of the time (Table 1).

Mean evaluation scores were relatively high for live sections, generally above 4.5 on a 5-point scale (Table 1). Differences in mean values between live and remote sites ranged from 0.18 to 0.47. For comparative purposes, the college-wide mean for the "instructor overall rating" (Question 10) was 4.35 for fall semester 2008. Therefore, students in live sections rated instructors 0.24 points above the college mean, whereas remote site students rated instructors 0.07 points below the college mean. The college-wide mean for the "course overall rating" (Question 11) was 4.16 during fall semester 2008. The students in live sections rated the course 0.28 points above the mean, whereas the students in remote sections rated the course 0.15 points below the college mean.

Discussion

The main objective of this study was to examine the differences in student evaluation scores returned from students at live and remote sites in DE courses delivered by IVC. The data show that the students at remote sites gave statistically lower evaluation scores to instructors on all but one question in the standard 11-question evaluation instrument, in agreement with anecdotal evidence provided by faculty. This is relatively strong evidence that the IVC technology is associated with lower student evaluations, given the diversity of course topics, the number of instructors, and number of sites involved in the analysis. Further, considering the low enrollment and the fact that the data were obtained over three consecutive years, it is likely that most students that had provided evaluations had been exposed to both live and IVC delivery, and thus had experienced courses both ways when they rendered their evaluations. The results are in agreement with studies by Clow (1999) and Chisholm et al. (2000) who also found lower evaluations rendered by students at remote sites in courses delivered by IVC. However, the study by Spooner et al. (1999) and references cited therein suggest that IVC has no consistent impact on student evaluation of teaching. Our results are therefore among the minority of studies that show a consistent, negative association between IVC and student evaluation scores. We acknowledge that externalities other than delivery technology not measured or accounted for here, affect student evaluations scores and therefore cannot completely attribute the results to IVC (Fleming et al., 2005).

A secondary objective was to evaluate the magnitude of the differences in evaluation scores between live and remote site students and determine if instructors were being disadvantaged by the IVC technology, and if a change in delivery mode were warranted. On average, instructors and courses received scores about 0.3 and 0.4 points lower (respectively) from students at remote sites than those at live sites on a 5.0-point scale. While statistically significant, the practical significance is probably small and may not seriously disadvantage instructors. The mean scores show that the perceived quality of teaching is very good overall (Table 1); even remote site mean scores were above 4.0 on a 5.0-point scale. Thus, it is unlikely that these scores would be viewed as poor quality teaching since they all fell within the "above average" to "excellent" range. Remote site evaluation scores were less than 0.15 points below college mean scores, and this minor difference would probably not affect annual evaluation or promotion and tenure of faculty. It should be noted that the values summarized in faculty evaluation documents are the averages of live and remote site students, not the section-by-section means as presented here. Thus, overall mean scores for courses and instructors would be virtually indistinguishable from college means. We believe that while the scores are not punitive, faculty concern is justified, and it is reasonable to wish to have scores that are truly reflective of their teaching ability. Also, it is clear that students are less satisfied when receiving instruction via IVC

than face-to-face. Thus, for these and other reasons, changes in technology may be warranted. In addition, a new student evaluation instrument that is capable of disentangling the effects of technology from instructor performance should be considered for DE courses, such as the one developed by Roberts et al. (2005).

An online platform for the degree completion programs in CALS is one potential alternative technology. Internet-based technologies generally do not have the same drawbacks as IVC, and do not require travel to IVC sites at specified times. In fact, the University of Central Florida abandoned the use of IVC several years ago after they discovered negative impacts on student satisfaction and superior online platforms to deliver their substantial portfolio of DE programs (Charles D. Dzuiban, personal communication). With respect to student evaluations, Tesone and Ricci (2008) found no significant differences in any of the 16 questions on an evaluation instrument completed by online or face-to-face student groups. A meta-analysis on this topic also showed no overall differences in student satisfaction between DE and face-to-face students (Allen et al., 2002). In another meta-analysis spanning 1985-2002, Bernard et al. (2004) separated studies into synchronous and asynchronous categories to study the effect of delivery mode on student attitudes and achievement (IVC is synchronous whereas most online platforms are asynchronous). Their analysis concluded that student attitudes toward courses were better for asynchronous than synchronous DE. Significantly, they showed that student achievement, measured by exam scores and other assessments, was higher for asynchronous than synchronous delivery. Bernard et al. (2004) also found that methodology and pedagogy had greater effect sizes than delivery platform with respect to student achievement, and suggested that the learner-centered methodology of asynchronous DE may be responsible for greater achievement than the instructor-centered methodology typically used in synchronous DE. A recent report from the U.S. Department of Education (U.S. Dept. of Ed., 2009) also suggests that students taking courses online performed better than students in face-to-face classes, with the same caveat that the methodology, not the technology per se may be the primary reason. Thus, it appears that a change in delivery platform from IVC (synchronous) to online (asynchronous), with associated changes in methodology and pedagogy may not only positively affect student satisfaction, but may enhance student achievement.

Literature Cited

Allen, I.E. and J. Seaman. 2009. Learning on demand: Online education in the United States, 2009. Needham, MA: The Sloan Consortium.

Allen, M., J. Bourhis, N. Burrell, and E. Mabry. 2002. Comparing student satisfaction with distance education to traditional classrooms in higher education: A meta-analysis. Amer. Jour. Distance Ed. 16: 83-97.

Bernard, R.M., P.C. Abrami, Y. Lou, E. Borokhovski, A. Wade, L. Wozney, P.A. Wallet, M. Fiset, and B. Huang. 2004. How does distance education compare with classroom instruction? A meta-analysis of the empirical literature. Rev. Educ. Res. 74: 379-439.

Chisholm, M.A., A.W. Miller, W.J. Spruill, H.H. Cobb, B.O. Reinhardt, A.V. Terry, R.L. Reese and W.E. Wade. 2000. Influence of interactive videoconferencing on the performance of pharmacy students and instructors. Amer. Jour. Pharmaceutical Ed. 64: 152-158.

Clow, K.E. 1999. Interactive distance learning: Impact on student course evaluations. Jour. Marketing Ed. 21:97.

Dzuiban, C.D. Director, Research Initiative for Teaching Effectiveness, University of Central Florida. Personal communication, July 2010.

Fleming, R.A., E.F. Bazen, and M.E. Wetzstein. 2005. Measuring the impact of externalities on college of agriculture teaching evaluations. Jour. Agri. Appl. Econ. 37: 635-645.

McKenney, C.B., E.B. Peffley, and I. Teolis. 2010. Comparison of time investment in common teaching practices among three instructional methods. HortTechnology 20: 245-249.

Parsad, B. and L. Lewis. 2008. Distance education at degree-granting postsecondary institutions: 2006-07. (NCES 2009-044). National Center for Education Statistics, Institute of Education Sciences, U.S. Department of Education. Washington, D.C.

Roberts, T.G, T.A. Irani, R.W. Telg, and L.K. Lundy. 2005. The development of an instrument to evaluate distance education courses using student attitudes. Amer. Jour. Distance Ed. 19: 51-64.

Seaman, J. 2009. Online learning as a strategic asset, Volume II: The paradox of faculty voices: Views and experiences with online learning. Association of Public and Land-grant Universities, Washington, D.C.

Spooner, F., L. Jordan, B. Algozzine, and M. Spooner. 1999. Student ratings of instruction in distance learning and on-campus classes. Jour. Ed. Res. 92: 132-140.

Tesone, D.V. and P. Ricci. 2008. Student perceptions of web-based instruction: A comparative analysis. Jour. Online Learning and Teaching. 4: 317-324.

Thornsbury, S. and W. Griffin. 2002. Technology trade-offs in agribusiness distance education, In: Zazueta, F.S. and J. Xin (eds.). In: Proc. World Congress of Computers in Agriculture and Natural Resources. ASAE Publication Number 701P0301.

U.S. Department of Education, Office of Planning, Evaluation, and Policy Development. 2009. Evaluation of evidence-based practices in online

e-learning: A meta-analysis and review of online learning studies. U.S. Dept. of Education, Washington, D.C.

Wilson, R. 2010. For-profit colleges change higher education's landscape. http://chronicle.com/article/For-Profit-Colleges-Change-/64012/. The Chronicle of Higher Ed. Accessed February 9, 2010.

Comparison between Online Activity and Performance in a Distance Education Equine Science Course

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Abstract

This study was designed to examine the online activity of students (n=72 over three semesters) enrolled in a distance education equine science course. The tracking function of Vista 4.0 (Vista Blackboard) provided information about the students' activities online. Students were categorized based on if they were successful in the course (A, B grade, n=55), unsuccessful (C or D grade, n = 9 students) or those who failed or did not complete the course (n = 8 total). Analysis of variance was used to determine if activity differed across the categories and correlation analysis was used to determine if online activity was related to the students' final grade. There were significant positive relationships between the time spent online, number of online sessions and the number of files opened, with the student's final grade. Further, students who were successful in the course were more active online, having significantly more online sessions than those who failed ($P < 0.05$) and there was a tendency for successful students to spend more time online than those who were unsuccessful ($P < 0.1$). These results show that online activity can affect the final outcome in a distance education course and therefore faculty should encourage student engagement in their courses and monitor student activity to gauge these efforts.

Introduction

Distance education (DE) is fast becoming a popular way for students to take courses and obtain degrees. The Sloan Consortium reported that close to four million students (20% of U.S. students) took at least one online class in fall 2007(Allen and Seaman, 2008). This interest in distance education is expanding into several disciplines, including Animal Science.

Students taking Animal Science classes are changing, in particular with more women entering the field hoping to pursue veterinary school (McNamara, 2009). In addition, more students in the field are from urban and suburban backgrounds (McNamara, 2009). Within several Animal Science departments, companion animals and horses are the most popular species (Meyer, 1990; Moore et al., 2008). Because of the increased interest in fields such as equine science, there is a need to offer new opportunities for study. One such way to satisfy these interests is to offer online courses through distance education, in addition to traditional live classes. Distance education further enables students to take courses while living elsewhere, working full or part-time and/or balancing a family.

Distance education is criticized because of the lack of hands-on learning (Ma and Nickerson, 2006). However, several introductory-level Animal Science courses do not have laboratories in which hands-on activities are necessary and are therefore well suited for development into online classes. We have created a distance education version of a freshman level introductory equine science course (ANS 110; Introduction to Equine Science). The course provides content through recorded lectures using Camtasia (TechSmith Corp. Okemos, MI) which are loaded onto a learning management system (Vista 4.0, Blackboard Inc. Washington, D.C.). Course notes (PowerPoint, Microsoft Corp.) are also made available for download. Learning is assessed through the use of online open-book quizzes and closed-book proctored exams. Student interaction is encouraged through the use of online discussions, chat sessions (both on Vista) and Elluminate (Elluminate Inc., Pleasanton, CA) review sessions, as well as being able to view and review material such as course notes and recorded lectures.

Whether or not students take advantage of the course resources to the full extent, likely impacts their performance in the class. Performance in the classroom is influenced by many factors including self-efficacy and previous experience (Joo et al., 2000; Perkins and Andreasen, 2001; Schunk, 1995) but may also be influenced by class attendance (Devadoss and Foltz, 1996; Marburger, 2006) and study habits (Plant et al., 2005).

Thus, it is of interest to determine how the student's use of online resources is related to performance, as online activity in a DE class likely reflects both attendance (through viewing lectures and accessing class notes) and study time (reviewing notes and lectures). The objectives of this study were to use the tracking tool of Vista to quantify the online activities of the ANS 110 students. It was hypothesized that students, who embraced the online culture and spent more time online, viewing files and engaging in discussions, would perform better in the class than those who spent less time online.

Methods

This study used data collected from three semesters of ANS 110 taught in the summers of 2007, 2008, and 2009. The 2007 and 2008 courses were 10-week sessions and the 2009 course was a five-week session. There were 18, 36, and 18 students enrolled in the course over the three years, respectively.

Over the three years the content remained essentially the same, with new recordings produced each year. The grading scheme was the same each year, with two "midterm" exams and a final exam, quizzes, a term paper, and participation generating points towards the final grade. Participation points were derived from the students' activity in the online discussions and in the Elluminate review sessions.

The tracking tool of Vista enables teachers to determine when students were logged onto the course, how long they spent online and what they accomplished. Data from these summaries used in the present study included; total time online (converted to minutes), number of times they logged on (total sessions), number of discussions read, number of discussions posted and the total number of files viewed.

For the students who completed the course, the correlation between total time online, number of times logged on, number of discussions read, number of discussions posted and number of files viewed and the student's performance in the course (final grade) were determined. In addition, students were categorized as successful (received an A or B grade), unsuccessful (C or D) or fail (Morris et al., 2005). The fail group included students who earned a grade <60% as well as incomplete students who did not complete the course (did not take all assigned tests or quizzes and failed to submit the paper, thus achieving grades of 0 on these assessments), but did not withdraw from the course, and therefore also failed. One-way analysis of variance was used to determine if Vista usage differed between these groups of students. Bonferroni testing compared groups when the overall model was significant. Significant differences were denoted at $P < 0.05$, while trends were identified at $P < 0.1$. Statistical analysis utilized GraphPad Prism 5.0 (GraphPad Software Inc., LaJolla, CA). Data are presented as mean ± SEM.

Results and Discussion

Data from a total of 72 students were included in the study. The average (± SEM) grades in 2007, 2008, and 2009 were 83.89 ± 4.8%, 86.90 ± 1.8%, and 90.16 ± 2.2%, respectively. There was no significant difference in overall grades between the three years. The tracking data for the students in each year is shown in Table 1. There was no significant difference in any of the activity variables between the years, likely due to the wide variation in student activity.

Despite wide variation in online activity, there was a significant relationship between student performance and online activity in students who completed the course. The total number of online sessions ($P = 0.002$), files viewed ($P = 0.003$) and total time online ($P = 0.0002$) were positively related to the student's final grade (Figure 1). These findings may be comparable to studies that have reported a relationship between class attendance and performance (Devadoss and Foltz, 1996; Marburger, 2006). These findings also support the data from Wang and Newlin (2000, 2002) who reported significant relationships between online activities such as homepage hit rate, forum postings read and forum postings written in an online psychology class.

Table 1. Online Activities (average per student; mean ± SEM and [range]) of Students Who Completed the Course. There Were No Differences in Activity between the Years.

	Total Number of Online Sessions	Total Time Online (min)	Discussions Read	Discussions Posted	Total Files Viewed
2007	84.4 ± 13.7 [14 - 255]	2154 ± 349.6 [337 - 6084]	359.6 ± 147.0 [0 - 2361]	8.1 ± 1.3 [0 - 18]	340 ± 40.4 [81 - 640]
2008	90.4 ± 10.9 [22 - 290]	2493 ± 421.6 [614 - 10625]	756.3 ± 315.0 [2 - 9185]	8.6 ± 1.2 [1 - 24]	142.6 ± 12.9 [27 - 361]
2009	69.6 ± 6.2 [33 - 119]	2624 ± 208.2 [761 - 3882]	165.5 ± 21.9 [4 - 377]	5.9 ± 0.56 [1 - 18]	168.8 ± 14.49 [60 - 288]

One might have expected a stronger relationship between online activity and performance in an online class than what was observed. In fact, there were many students who performed well, but were not active, thus decreasing the strength of the relationships between performance and online activity. Because of the nature of an online course, the flexibility enables students to gauge the effort required to achieve the desired grade. It is likely that students who had ample equine experience did not have to spend as much effort learning the material (Pratt-Phillips and Schmitt, 2010). It is also possible that students used other sources for learning, such as the textbook or downloaded notes. It should be pointed out that the tracking tool in Vista could not determine if a student is actively working on course material. For example, if a student were to log on and open a file, the tracking would start to record the activity, but if the student stepped away from their desk (perhaps for several hours), the tracking would have continued (there is a 2-hr time-out). The number of times the student logged on and the number of times the files were viewed may be a better indicator of effort.

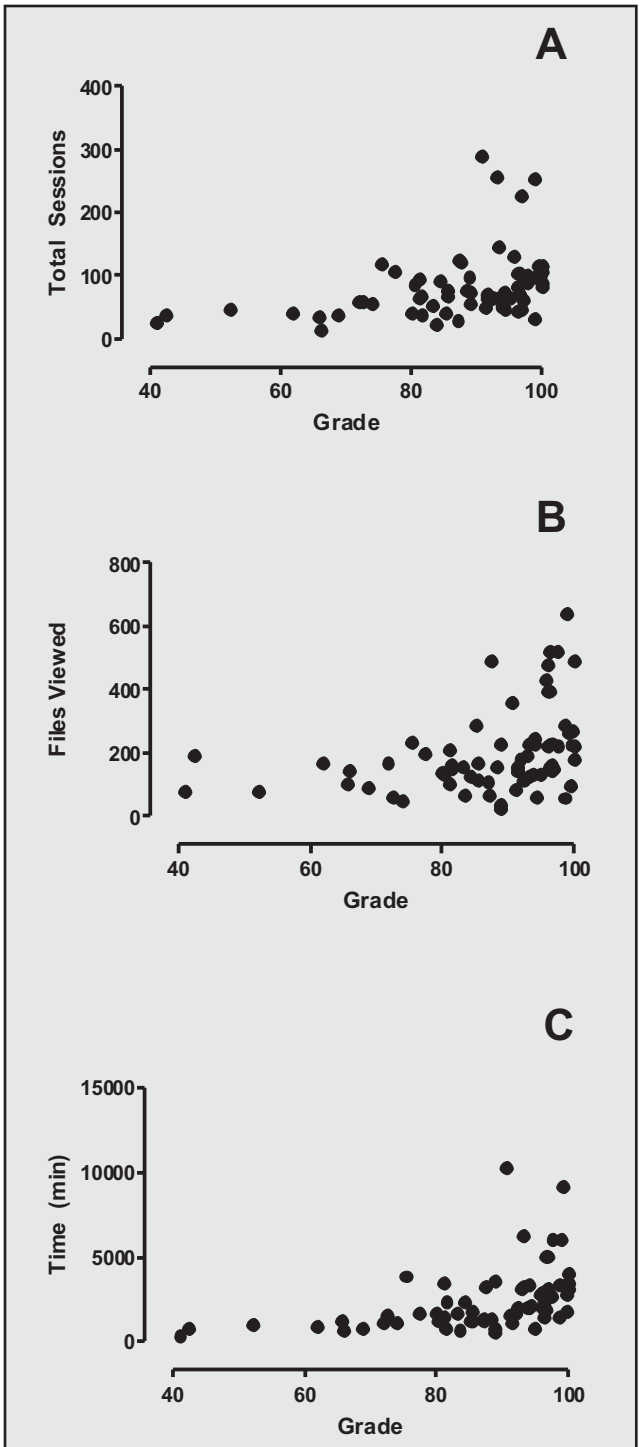

Figure 1. Relationship between final grade (%) and the total number of online sessions (A, P = 0.002, r = 0.37), the total number of files viewed (B, P = 0.0032, r = 0.35) and the total time spent online (C, P = 0.0002, r = 0.44) in students who completed the course.

The tracking feature of the learning management system provides a tool to quantify student involvement, despite the aforementioned limitations. The average time spent online in this course was approximately 43 hours. This is more than the approximate 35 hours spent in the traditional face-to-face version of ANS 110 over a 15-week semester. It is likely that the additional time in a DE class also reflects student studying (reviewing notes and lectures) to some degree, though some students may download notes for reviewing. The total time spent online also does not include the Elluminate review sessions, which were held at least one to two times per week. Meanwhile, a face-to-face student would spend time outside the classroom reading and studying. Thus, it is likely that the total time spent learning material for this online course is similar to that of its face-to-face equivalent course.

Studies that attempt to predict performance in a traditional class based on study time are conflicting (Plant et al., 2005), likely due to difficulty accurately estimating the time students spend on course materials outside of class. Similarly, it was reported that while online activity is correlated to performance in an online class, student's reported study habits were not (Wang and Newlin, 2002). Online activity likely reflects both attendance and study time to some degree, and therefore may be a better quantitative indicator of performance (Wang and Newlin, 2002).

The present study also categorized students as successful (A or B grade, 55 students), unsuccessful (C or D grade, nine students) or fail (eight students). This was based on the model of Morris et al. (2005) to include students who did not complete the course. There were a total of five students (one in 2007 and four in 2008) who did not complete the course, but did not withdraw. These students therefore received an incomplete, failing grade. Of those students who completed the course, there were three students who also failed. There were significant differences between the students who were successful in the course compared to those who failed the course (Table 2). Specifically, there was a significant difference ($P < 0.05$) in the number of sessions started by students who were successful compared to those who failed the course. There was also a significant difference in the number of files viewed between those students who were successful and those who failed ($P < 0.05$). In addition, there was a significant difference in the total time spent online between students who were successful and those who failed ($P < 0.05$) and there was a trend for a difference between those who were successful and those who were not successful in the course ($P < 0.1$). The findings are similar to the work of Morris et al. in which students who were successful in online courses were more active than those who were non-successful (Morris et al., 2005).

Students who do not complete an online course are not uncommon (Morris et al., 2005). One of the six students completed two of the three exams, but then did not complete the final, the quizzes, or paper. Two of the students only logged onto the course five times. It is possible these students underestimated the effort required for such a course, became busy with other ventures or were not comfortable with the online learning environment. Similarly, Wang and

Table 2. Online Activity (mean of ± SEM) of Students who were Successful in the Course (A or B grade), Unsuccessful (C or D grade) and those who Failed (including those who were incomplete)

	Successful (n = 55)	Unsuccessful (n = 9)	Fail (n = 8)
Total number of online sessions	89.8 ± 7.4[a]	59.0 ± 11.3	22.5 ± 5.8[b]
Total files viewed	214.3 ± 18.5[a]	137.4 ± 21.3	64.2 ± 21.7[b]
Total time online (min)	2705 ± 255.8[a,c]	1212 ± 140.6[d]	358 ± 87.1[b]

Columns with superscripts a, b are different at $P < 0.05$; columns with superscripts c, d are different at $P < 0.1$.

Newlin reported lower class performance in students who took an online class solely based on availability, compared to students who prefer online courses (Wang and Newlin, 2002). It is unknown however why these students would not withdraw and drop the course officially. It may be recommended that the tracking tool be utilized frequently throughout the semester to detect those who may be less active and therefore at risk for not completing the course. This was done in the case of these students, to no avail however. There were additional students who began the course (approximately two per year) but officially withdrew before the end of term and therefore their data is not included in this study.

The present study highlights the relationship between student online activity and performance in an online class. Tracking student activity periodically throughout the course may help identify the students at risk for not completing the course and may be used as an estimate of student interest and engagement (Wang and Newlin, 2002). Increased interaction with the faculty and other students through the use of well-designed discussion forums or online learning communities may help student engagement (Vonderwell, 2003; Wang and Newlin, 2000, 2002). Synchornous learning opportunities, such as with Elluminate, may also encourage student activity. Along with any efforts made by faculty to provide strategies to engage students, ultimately students must become active and independent learners to be self-motivated to participate in such activities (Palloff and Pratt, 2001).

Summary

The data presented herein utilize a tracking tool to show that students who are more active online perform better in an online distance education course. This information may be of interest to faculty so they can design their course to encourage students to log on regularly and engage themselves online.

Literature Cited

Allen, I. E. and J. Seaman. 2008. Staying the course. Online Education in the United States, 2008. Needham, MA: The Sloan Consortium.

Devadoss, S. and J. Foltz. 1996. Evaluation of factors influencing student class attendance and performance. American Journal of Agricultural Economics 78: 499-507.

Joo, Y.-J., M. Bong, and H.-J. Choic. 2000. Self-efficacy for self-regulated learning, academic self-efficacy, and internet self-efficacy in web-based instruction. Educational Technology Research and Development Journal 48: 5-17.

Ma, J. and J.V. Nickerson. 2006. Hands-on, simulated, and remote laboratories: A comparative literature review. ACM Computing Surveys 38: 1-24.

Marburger, R. 2006. Does mandatory attendance improve student performance? Journal of Economics Education 37: 148-155.

McNamara, J.P. 2009. ASAS Centennial Paper: The future of teaching and research in companion animal biology in departments of animal science. Jour. Animal Science 87: 447-454.

Meyer, J.H. 1990. Influence of alumni careers and students' educational pathways on animal science undergraduate teaching programs. Jour. Animal Science 68: 3056-3068.

Moore, J.A., W.L. Flowers, and R.L. McCraw. 2008. Species preference of incoming animal science freshmen at North Carolina State University. Jour. Animal Science 86 E-Suppl: 99.

Palloff, R.M., and K. Pratt. 2001. Lessons from the cyberspace classroom: The realities of online teaching. San Francisco, CA: Jossey-Bass Publishers.

Perkins, T.L., and R.J. Andreasen. 2001. Evaluation of student performance in an introductory animal science course by pre-test and post-test scores. Jour. Animal Science 79 Suppl 1: 164.

Plant, E.A., K.A. Ericsson, L. Hill, and K. Asberg. 2005. Why study time does not predict grade point average across college students: Implications of deliberate practice for academic performance. Contemporary Educational Psychology 30: 96-116.

Pratt-Phillips, S.E. and S. Schmitt. 2010. The effect of previous equine experience on performance and effort required in an introductory level equine science class. NACTA Journal 54: 41-45.

Schunk, D.H. 1995. Self-efficacy, motivation and performance. Journal of Applied Sport Psychology 7: 112-137.

Vonderwell, S. 2003. An examination of asyncrhonous communication experiences and perspectives of students in an online course: A case study. Internet and Higher Education 6: 77-90.

Wang, A.Y. and M.H. Newlin. 2000. Characteristics of students who enroll and succeed in psychology web-based classes. Journal of Educational Psychology 92: 137-143.

Wang, A.Y. and M.H. Newlin. 2002. Predictors of web-student performance: The role of self-efficacy and reasons for taking an on-line class. Computers in Human Behavior 18: 151-163.

Demographics of an Undergraduate Animal Sciences Course and the Influence of Gender and Major on Course Performance

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Abstract

Over a period of three 10 week quarters, students enrolled in an introductory animal sciences course were evaluated with the objectives of identifying demographic variables of the student population and their relation to performance, factors associated with enrollment, and interest areas in animal sciences. The findings showed that the majority of participants were female and classified as animal sciences majors. Veterinary medicine was a career objective of 59% of the students, while less than 5% indicated an interest in pursuing a career engaged in food animal production. Companion animals (dogs and cats) represented the species interest of nearly 50% of the students, followed by equine at 24%. Food producing animals (cattle, goats, poultry, sheep, and swine) represented the primary interests of only 20% of students; however, 43% indicated that cattle was the most beneficial species learned and reported lack of prior knowledge (27%) as a primary reason for the selection. Students perceived nutrition as the most valuable discipline learned, followed by reproduction and behavior. There were no differences in overall course performance between male and female students or animal sciences and non-agriculture majors; however, the mean cumulative course grade was lower for agriculture majors excluding animal sciences ($P < 0.05$).

Introduction

While the number of students enrolling in animal sciences departments remains strong, the demography of the student population continues to evolve (Buchanan, 2008). Traditional roles of animal sciences departments in preparing graduates for careers in production agriculture are being replaced by more fundamental missions to educate students for diverse careers in the sciences (Kauffman, 1992). An increasing number of animal sciences students are urban, female, and declare career interests that are dominated by the veterinary profession (Edwards, 1986; Mollett and Leslie, 1986; and Reiling et al., 2003). Furthermore, increased diversity in animal species and scientific discipline interests accompany changes in the student population. Greater percentages of students in animal sciences have interests in companion animals and behavior, topics that were nonexistent in early curricula of animal sciences departments, but are now routinely taught (Buchanan, 2008).

In order for an academic program in animal sciences to remain successful, it must be relevant in a changing society and address the interests and needs of its students. To this end, educators must be knowledgeable of their audience. The overall aim of this study was to characterize students enrolled in an introductory animal sciences course at a land grant university, with the objectives of identifying demographic variables of the student population and their relation to performance, as wells as factors associated with enrollment including student motives for entering the course and career objectives. In addition, student interest areas in animal sciences were documented.

Methods

The cohorts for this study were students enrolled in Introductory Animal Sciences at The Ohio State University between fall 2007 and fall 2008. This 10 week course consisted of four 48-minute lectures and one of three 108-minute laboratory sessions each week. Introductory Animal Sciences is a course that utilizes a biological systems based approach to equip a broad range of students with the knowledge and critical thinking skills required to address questions concerning the maintenance, reproduction, and performance of domestic animals utilized for human benefit. The course embodies fundamental concepts in areas of genetics, reproduction, nutrition, behavior, and biotechnology; and students are introduced to the molecular and cellular mechanisms that underscore the function of biological systems and how knowledge in this area is applicable toward advancement of domestic animals. The focus is on traditional agricultural species including: cattle, sheep, swine, poultry, and horses; as well as non-traditional species including: llamas, alpacas, and aquatics. The course is a degree requirement within the animal sciences major and animal production minor.

Pre-course questionnaires were developed to address demographic variables (gender, major classification, and career objectives), motives for course enrollment, and species areas of interests. The pre-course questionnaire was provided to students

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who attended the initial day of the course (n=210). Post-course questionnaires were developed to assess students perceived value of subject matter taught (animal species and disciplines) and was provided to students who attended the final day of the course (n=199). Gender and overall course performance were determined from course enrollment records. Course performance was based on final course grades (n=212) that were determined from examinations, writing composition, laboratory exercises, and participation. Statistical analysis were performed by ANOVA using the general linear model (PROC GLM) procedures of SAS (version 9.1; SAS, Cary, NC) appropriate for a completely randomized design to determine differences in means for cumulative grades. Predictors in the model were gender and major classification (animal sciences; agriculture, excluding animal sciences; or non-agriculture). Data are presented as means ± SEM with $P \leq 0.05$ considered significant. Fisher's Exact Test (PROC FREQ) was used to evaluate the relationship between categorical values (major classification and career objectives on species interests) with $P \leq 0.05$ considered significant.

Results and Discussion

This survey provides a random sample of the student population of an introductory animal sciences course at a land grant university. The majority of participants (Table 1) were female (79%) and classified as animal sciences majors (78%) with the remaining data set consisting of other agricultural (13%), non-agricultural (8%), or undecided (1%) majors. The greater percentage of females enrolled in the course is in agreement with findings of Hoover and Marshall (1998) and Koon et al., (2009) that reported greater enrollments for females versus males in college of agriculture classes, but differs from Mollett and Leslie (1986) and McMillan et al. (2009) that reported nearly equal gender distribution of animal sciences students. Greater female enrollment in the current study may be attributed to the primary career objectives of students, with approximately 59% of total students indicating veterinary medicine as their career objective, increasing to 68% when only animal sciences majors were considered (Table 2). Previous findings of others demonstrated that the percentage of students that declare veterinary medicine as a professional objective closely parallels the gender distribution of introductory animal sciences courses (Edwards, 1986). Female enrollment reflects the drastic change in the ratio of men to women in veterinary medicine during the last three decades with women now representing greater than 70% of all veterinary students (Brown and Silverman, 1999; Elmore, 2003). The percentage of students classified as animals sciences majors exceeded other reports where 50% or less of student enrollment was ascribed

Table 1. Gender and Major Classification of Students Enrolled in an Introductory Animal Sciences Course

Variable	Number	Percent
Gender		
Female	167	78.77
Male	45	21.23
Major classification		
Agribusiness	10	4.81
Agricultural Communication[1]	3	1.44
Agricultural Education[1]	10	4.81
Animal Sciences	158	75.96
Animal Sciences/Veterinary Technology	4	1.92
Biology	8	3.85
Undecided	2	0.96
Zoology	6	2.88
Other[2]	7	3.37

[1] Animal Sciences may be required as a minor course
[2] Food, Agricultural, and Biological Engineering, Crop Science, English, Food Business Management, German, Landscape Architecture, Nutrition

Table 2. Career Objectives of Students Enrolled in an Introductory Animal Sciences Course

Career objectives	Total Students		Animal Sciences Majors[1]	
	Number	Percent	Number	Percent
Animal care[2]	13	6.57	10	6.33
Business	10	5.05	1	0.63
Education	10	5.05	0	-
Food animal production	7	3.54	7	4.43
Uncertain	10	5.05	10	6.33
Veterinary technician	12	6.06	12	7.59
Veterinary medicine	117	59.09	108	68.35
Other[3]	19	9.60	10	6.33

[1] Includes students pursuing the Animal Sciences/Veterinary Technology dual degree.
[2] Approximately 79% of total students and 67% of Animal Sciences majors that listed animal caretaker as a career goal specified desired employment with a zoo, while the remaining areas were equine training and rehabilitation.
[3] Includes postgraduate studies in human medicine, law, or reproduction; athletics; library sciences; journalism; and wildlife conservation.

Table 3. Motives for Students Enrolling in an Introductory Animal Sciences Course

Reason	Number	Percent
Major requirement	95	42.24
Minor requirement	18	8.57
Animal interest	47	22.38
Elective	1	0.48
Exploration[1]	6	2.86
Increase animal experience	2	0.95
Increase animal knowledge	26	12.38
Preparation for veterinary school	15	7.14

[1] Exploration is a program designed to assist students in deciding on a major or minor through investigation of courses within a degree program

to animal sciences majors (Edwards, 1986; Reiling et al., 2003). The requirement of the course for additional agricultural majors and select veterinary college admissions is expected to contribute to the percentage of majors and non-majors that enroll in an introductory animal sciences course at different universities. Indeed, a nearly 30% enrollment of biomedical majors was reported by Edwards (1986) and attributed to the pre-professional course requirement of the universities veterinary college. A pre-professional course requirement for introductory animal sciences is not mandated for veterinary admissions at the university of the current study. While the majority of students enrolled in the course were interested in veterinary medicine, only 7% stated preparation for veterinary college as a motive for enrollment with 42% stating the need to satisfy a major requirement as the primary motive (Table 3).

Less than 5% of students indicated an interest in pursuing a career engaged in food animal production. This percentage is considerably less than the 25% reported nearly 25 years ago (Edwards, 1986), but is comparable to the more recent 8% reported by Reiling et al., (2003). An increase in efficiency of production agriculture has been met with a decreased demand for individuals engaged in production practices and is reflective of the U.S. census data (1990) that indicates less than 2% of the U.S. population lives or works on farms. Yet, there remains a requirement for knowledgeable graduates to address the needs of the world's food and agricultural systems and recruitment of qualified students to this end remains a concern (Wildman and Torres, 2001). Findings by Conroy (2000) show that agricultural occupations of interest are established as early as middle school and less than 7% of middle school students report an interest in production agriculture. Factors including reduced exposure to agriculture professions, influences of family and friends, and lack of role models in the profession are known to play a role in selection of an agricultural major (Wildman and Torres, 2001) and are likely to contribute to career decisions. It is expected that the greater percentage of women enrolled in animal sciences also contributes to the lesser reports of career interests in production agriculture as there are fewer numbers of females in agriculture positions to serve as role models and a less inclusive environment in agricultural sciences for females (Beck and Swanson, 2003).

Thirty-seven percent of students responded that information learned regarding nutrition was most valuable toward their academic goals, followed by reproduction and behavior (25 and 17%, respectively; Table 4). Greater percentages of students reported reproduction (36%) and genetics (25%) as the second most valuable discipline topic learned. This is in contrast to Reilings et al., (2003) that reported

Table 4. Primary and Secondary Discipline Interests of Students Enrolled in an Introductory Animal Sciences Course [1]

Discipline[2]	Primary, %	Secondary, %
Behavior	17.22	18.84
Domestication	9.27	5.80
Genetics	10.60	24.64
Lactation	0.66	0.00
Nutrition	37.09	14.49
Reproduction	25.17	36.23

[1] 151 of 199 students completing the survey question responded with their primary discipline interests; whereas, only 69 students provided their secondary discipline interests.
[2] In addition to the listed disciplines, cell biology is covered, however, was not selected as a primary or secondary interests by students.

Table 5. Primary Species Interests and Most Beneficial Species Learned of Students Enrolled in an Introductory Animal Sciences Course [1]

	Interest		Learned	
Species	Number	Percent	Number	Percent
Cat	17	8.50	-	-
Cattle[2]	30	15.00	78	43.33
Dog	80	40.00	-	-
Horse	47	23.50	43	20.48
Goat	3	1.50	4	2.22
Lamoids	2	1.00	1	0.56
Poultry[3]	3	1.50	10	5.56
Sheep	3	1.50	13	7.22
Swine	11	5.50	31	17.22
Other[4]	4	2.00	-	-

[1] 200 students responded to species interest in the pre-questionnaire, whereas 180 students responded to the most beneficial species learned in the post-questionnaire. The course focus included food animals and equine. Discussions of companion and exotic animals were for comparative purposes primarily.
[2] Includes both beef and dairy cattle
[3] Includes chickens, ducks and turkeys
[4] Includes ferrets and rabbits

Figure 1. Student reasons for most valuable species learned in an introductory animal sciences course

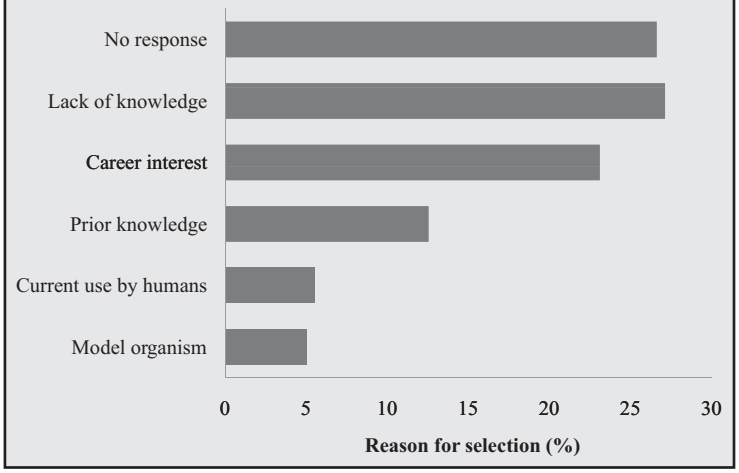

Table 6. Effect of Major Classification and Career Objectives on Species Interests of Students Enrolled in an Introductory Animal Sciences Course

Variable		Species Interests, %[1,2]							
		Cattle	Companion animals	Horses	Poultry	Small ruminants[3]	Swine	Other	*P-Value*
	n								
Major classification									< 0.001
Animal Sciences[4]	148	14.19	48.65	25.68	2.70	3.38	0.68	4.73	
Agriculture[5]	32	25.00	37.50	18.75	3.13	9.38	6.25	-	
Non-agriculture[6]	18	5.56	61.11	16.67	-	5.56	6.25	-	
Career objectives									<0.001
Animal care	13	7.69	5	38.46	-	-	-	-	
Business	10	50.00	-	40.00	-	-	-	10.00	
Education	10	20.00	50.00	10.00	-	10.00	10.00	-	
Food animal production	7	71.43	-	14.29	14.29	-	-	-	
Uncertain	10	30.00	30.00	20.00	-	10.00	10.00	-	
Veterinary technician	12	8.33	75.00	8.33	-	8.33	-	-	
Veterinary medicine	117	7.69	55.55	25.64	0.85	2.55	5.13	2.56	
Other	19	21.05	31.58	15.79	5.26	10.52	5.26	5.26	

[1] A dash indicates that no student within the respective major classification or career objectives selected that species.
[2] Association between major classification or career objectives and species interests, Fisher's exact test.
[3] Includes goats, sheep, alpacas, and llamas.
[4] Includes Animal Sciences/Veterinary Technology dual degree students.
[5] Excludes Animal Sciences majors.
[6] Students enrolled in colleges other than the College of Food, Agricultural, and Environmental Sciences.

greater disciplinary interests in behavior relative to subjects of nutrition and reproduction for introductory animal sciences students. Companion animals (dogs and cats) represented the species interest of nearly 50% of the students entering the course (Table 5), followed by equine (23.5%). Food production animals (cattle, goats, poultry, sheep, and swine) represented the primary interests of only 20% of students. With 77% of households reporting animal ownership of dogs or cats and 20% owning horses (AVMA, 2007) the interest in companion animals and equine is not surprising as students in animal sciences are often most interested in animals of familiarity (McNamara, 2009). Upon completion of the course, 43% of students reported that the knowledge of cattle learned was most beneficial toward their academic goals (Table 5). It should be noted that the course focus is food producing animals and equine with discussions of companion animals and exotics restricted to comparative purposes; however, when asked if the course should include additional species, 44% of students responded no, whereas 16 and 5% suggested additional information on companion and exotic animals, respectively, should be included. Lack of prior knowledge (27%) was a primary reason provided for the most beneficial species learned (Figure 1). This data suggests that the knowledge and applications of the science of large domestic animals can be used to deliver fundamental biological principles to students regardless of species interests.

The species interests of students were related to major classification and career objectives ($P < 0.001$; Table 6). A greater percentage of students in non-agricultural related majors declared companion animals as their primary species interests (61%) compared to animal sciences (49%) and agricultural majors excluding animal sciences (38%). For animal sciences and non-agricultural majors, equine represented the second most reported species interests, whereas, agricultural majors excluding animal sciences were more likely to report cattle second to companion animals (Table 6). When species interests relative to career objectives were assessed, greater than 80% of students considering a profession in veterinary medicine reported interests in companion animals or equine. The limited interests in food producing animals for students that reported primary career goals in veterinary medicine was most pronounced when poultry and small ruminants were considered. These findings supports recent suggestions that there is a disproportionate number of veterinary students pursuing companion animal and equine medicine, resulting in an increased demand for students interested in food supply medicine to maintain the security of the food supply (Leighton, 2004; Prince et al., 2006). Interestingly, of the limited

Table 7. Mean Cumulative Course Grade by Gender and Major Field of Study of Students Enrolled in an Introductory Animal Sciences Course

Variable	n	Grade, %[1]
Gender		
Female	167	81.05 ± 1.36
Male	45	80.87 ± 3.06
Major classification		
Animal Sciences[2]	162	82.38 ± 1.52[a]
Agriculture[3]	27	76.09 ± 2.52[b]
Non-agriculture[4]	19	84.42 ± 3.43[a]

[1] Values are means ± SEM. Labeled means within a row with superscripts without a common letter differ within variable, $P<0.05$.
[2] Includes Animal Sciences/Veterinary Technology dual degree students.
[3] Excludes Animal Sciences majors.
[4] Students enrolled in colleges other than the College of Food, Agricultural, and Environmental Sciences.

number of students reporting career objectives in food animal production, 71% reported cattle as their species interests and none reported interests in small ruminants or swine (Table 6).

Data regarding the impact of student gender on performance in agricultural courses is conflicting. Although higher-order learning abilities do not appear to differ between gender of students enrolled in the college of agriculture (Torres and Cano, 1995), McMillan et al., (2009) reported that female performance in undergraduate animal sciences courses was greater than males; whereas, Mousel et al., (2006) reported no difference in grade distribution between gender of students enrolled in an introductory forage crops management course. In the current study, there were no differences in overall course performance between male and female students ($P > 0.05$). Class performance also was similar between animal sciences and non-agriculture majors, whereas, the mean cumulative course grade was lower for agriculture majors excluding animal sciences ($P < 0.05$). Mousel et al., (2006) reported differences in grade distributions among agricultural majors enrolled in an introductory forage crop management course and attributed the findings to differences in agricultural background, with students that lacked an agricultural background being disadvantaged. Although information regarding agricultural background was not collected in the current study, this is not anticipated to be a factor underlying current grade differences between majors as it is well established that an increasing number of animal sciences students are classified as urban or suburban (Mollett and Leslie, 1986). It is more likely that the learning styles of students contributed to differences in grade distribution. Cano (1999) and Torres and Cano (1994) determined that students enrolled as animal sciences majors were predominantly field independent (analytical) learners, whereas field dependent (global) learning styles were more frequently reported for students of agribusiness and agricultural communications majors. Furthermore, field independent learners are more likely to report a greater cumulative grade point average than field dependent learners (Cano, 1999). As nearly 50% of the agricultural students excluding animal sciences declaring agricultural communications or agribusiness as their major, it is plausible that differences in learning styles contributed to class performance differences noted in the current study.

Summary

The mission of animal sciences to equip students with the knowledge and abilities to maintain animals for human use remains relevant despite the changing demographics of the student population. As greater percentages of students enroll in animal sciences with interests in companion animals and equine, educators must recognize the greater use of animals by humans that extends beyond agriculture. This study suggests that animal sciences instruction does need to drastically shift away from the teachings of food producing animals to meet the needs and interests of students enrolled in an introductory animal sciences course. Instead, focus should be directed toward student's comprehension of the global nature of the study of animals that encompasses multiple species and disciplines by using large domestic animals as a resource for teaching fundamental knowledge of biological principles. While the majority of students enrolled in the course were female with professional interests in veterinary medicine, success in the course was unrelated to gender. The minor interests in a career involving food animal production was not surprising in light of reports of the number of the U.S. population involved in production agriculture, but causes concern regarding the future availability of knowledgeable graduates to address the needs of food agriculture.

Literature Cited

AVMA (American Veterinary Medical Association). 2007. U.S. Pet ownership and demographics source book. Schaumburg, IL: AVMA.

Beck, M.M. and J.C. Swanson. 2003. Value-added animal agriculture: Inclusion of race and gender in the professional formula. Jour. Anim. Sci. 81: 2895-2903.

Brown, J.P. and J.D. Silverman. 1999. The current and future market for veterinarians and veterinary medical services in the United States: Executive summary. Jour. Am. Vet. Med. Assoc. 215: 161-183.

Buchanan, D.S. 2008. ASAS Centennial Paper: Animal science teaching: A century of excellence. Jour. Anim. Sci. 86: 3640-3646.

Cano, J. 1999. The relationship between learning style, academic major, and academic performance of college students. Jour. Ag. Educ. 40(1): 30-37.

Conroy, C.A. 2000. Reinventing career education and recruitment in agricultural education for the 21st century. Jour. Ag. Educ. 41(4): 73-84.

Edwards, R.L. 1986. Background, career objectives, and performance of students in introductory animal science. NACTA Jour. 30(1): 35-37.

Elmore, R.G. 2003. Recruitment and retention of veterinary students for food animal practices. Jour. Am. Vet. Med. Assoc. 222(12): 1697-1699.

Kauffman, R.G. 1992. Modernizing the animal science curriculum: Is change needed? Jour. Anim. Sci. 70: 2593-2596.

Koon, L.A.F., M.J. Frick, and C.G. Igo. 2009. What kind of students are enrolling in a college of agriculture and are they staying?: A mixed methods approach. NACTA Jour. 53(2): 21-28.

Leighton, F.A. 2004. Veterinary medicine and the lifeboat test: A perspective on the social relevance of the veterinary profession in the twenty-first century. Jour. Vet. Med. Educ. 31(4): 329-333.

McMillan, M., A. Bullion, K. Stutts, S. Kelley, M. Beverly, and L. Rakowitz. 1999. Variables affecting final grade outcomes in undergraduate animal science courses. NACTA Jour. 53(2): 29-33.

McNamara, J.P. 2009. ASAS Centennial Paper: The future of teaching and research in companion animal biology in departments of animal sciences. Jour. Anim. Sci. 87: 447-454.

Mollett, T.A. and E.K. Leslie. 1986. Demographic profile of students majoring in animal science. NACTA Jour. 30(1): 26-29.

Mousel, E.M., L.E. Moser, and W.H. Schacht. 2006. Impact of student background characteristics on performance in an introductory forage crops management course. NACTA Jour. 50(3): 8-12.

Prince J.B., D.M. Andrus, and K. Gwinner. 2006. Academic food-supply veterinarians: Future demand and likely shortages. Jour. Vet. Med. Educ. 33(4): 517-524.

Reiling, B.A., T.T. Marshall, J.H. Brendemuhl, J.A. McQuagge, and J.E. Umphrey. 2003. Experiential learning in the animal sciences: Development of a multispecies large-animal management and production practicum. Jour. Anim. Sci. 81: 3203-3210.

Torres, R.M. and J. Cano. 1994. Learning styles of students in a college of agriculture. Jour. Ag. Educ. 35(4):61-66.

Torres, R.M. and J. Cano. 1995. Examining cognition levels of students enrolled in a college of agriculture. NACTA Jour. 36(1): 46-54.

Wildman, M. and R.M. Torres. 2001. Factors identified when selecting a major in agriculture. Jour. Ag. Educ. 42(2): 46-55.

An Undergraduate Summer Research and Mentorship Experience for Underrepresented Students in the Agricultural Sciences[1]

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Abstract

Women, Native Americans, and other minority groups have historically been underrepresented in the agricultural sciences. The objectives of this program were to: 1) create and administer an undergraduate student research internship and mentorship program in the agricultural sciences; 2) increase the number of underrepresented students in agricultural science majors at Little Big Horn College, Sheridan College, and the University of Wyoming; and 3) conduct pre- and post-survey evaluations for undergraduate student participants. Undergraduate students in Wyoming and Montana were recruited and hired by an advisory group of faculty from each institution and local agricultural industry representatives. Students were assigned faculty mentors to supervise and assist interns with an agricultural science research project. Mixed methods analysis was used for student and program assessment via collection of quantitative and qualitative survey data. After completing the program, students reported an increased knowledge of agricultural science and research. In addition, the research and internship program was successful in exposing underrepresented students to the world of agricultural science and research and in recruiting them into agricultural science academic programs.

Introduction

Academic agricultural science programs require students who are technologically advanced with knowledge of the both the basic and applied sciences (Goecker et al., 2005). There is a need for the agriculture industry to recruit gifted and knowledgeable college graduates to fill vital agricultural industry positions. Therefore, it is critical that agricultural colleges and universities recruit, retain, and graduate gifted and knowledgeable students who major in agricultural disciplines and pursue careers in the agricultural sciences.

Undergraduate research experiences can help students to understand and implement the scientific method, develop fundamental research skills, and work collaboratively with students, staff, and faculty mentors (Grossman et al., 2010; Lopatto, 2008; Taraban, 2008). Coker and Davies (2002) administered a survey to the American Society of Plant Biologists asking six broad questions concerning undergraduate research and three questions concerning high school student research. They found that when researchers used undergraduates and high school students in the research laboratory, students would: generally be interested in learning more about plant biology, ask for assistance in career choices, have greater motivation to pursue graduate education, be more likely to co-author a published research paper, be trained in laboratory research techniques, and reinforce classroom learning. Krasny (1999) discussed high school student research and the importance of recruiting targeted students, providing a quality research experience, student understanding of the research process, gaining support of university researchers, and building the long-term sustainability of a high school research program. Cannon et al. (2006) surveyed students who participated in the Virginia Governor's School for Agriculture program for gifted and talented high school juniors and seniors. The Virginia program provided hands-on, cutting edge, scientific and academic instruction to gifted and talented high school students in order to develop their understanding of agriculture, human health, natural resources, and veterinary medicine. The researchers concluded that the Virginia program was successful and could be used as a recruiting model by exposing high school students to agriculturally related university programs and majors. Undergraduate student participation in summer internship programs are valuable and can assist students in obtaining a job or position after graduation (Fenwick and Gartin, 1990).

In addition to experiential learning, faculty-to-student mentorship is also important to the academic and career success of agricultural science undergraduates (Retallick and Pate, 2009). While mentoring in an academic setting has routinely occurred during student advising and teaching sessions, students can benefit from a more focused and specialized mentoring environment (Woirhaye and Menkhaus, 1996). Retallick and Steiner (2009) report on the

[1]Acknowledgements: This project was financially supported by USDA CSREES Secondary and Two-Year Postsecondary Agriculture Education Challenge Grants Award # 2007-38414-18161, the Wyoming Agricultural Experiment Station, and Sheridan College. The author thanks Mr. Jim Bennage of Sheridan College and Dr. Valerie Scott-Small of Little Big Horn College for their cooperation and mentorship of undergraduate students.
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Science With Practice program which provided undergraduate students an opportunity to gain practical experience working with a faculty mentor in an agricultural university research environment. Project participants were surveyed after completing the program and were reported to have gained valuable research experiences that enhanced their undergraduate academic careers.

In 2004, only 8% of bachelor degrees in the agricultural sciences were earned by minorities (U.S. Census Bureau, 2005). This is less than half of the parity line mark of 31% in the 18-24 year old U.S. population receiving bachelor degrees. In addition, minority students earn less than 10% of the awarded doctorate degrees in the U.S. However, minority students currently represent about 25% of U.S. college and university populations. Women have historically been underrepresented in the agricultural sciences (FAEIS, 2005). Therefore, organizations such as the National Science Foundation, the National Institutes of Health, and the United States Department of Agriculture (USDA) have funded undergraduate research internship and/or mentorship programs with emphasis to increase the number and competiveness of underrepresented students in the sciences.

The objectives of this program were to:

1. Create and administer an undergraduate student research internship and mentorship program to recruit students into the agricultural science majors at Little Big Horn College, Sheridan College, and the University of Wyoming;

2. Increase the number of underrepresented students in the agricultural science majors at Little Big Horn College, Sheridan College, and the University of Wyoming;

3. Conduct pre-survey and post-survey evaluations for each undergraduate student research intern participant through qualitative and quantitative data collection.

Project Area and Institution Descriptions

This project involved collaboration between Sheridan College (SC), located in Sheridan, WY; Little Big Horn College (LBHC), located in Crow Agency, MT; and the University of Wyoming (UW) Agriculture Experiment Station (AES) Sheridan Research and Extension Center (SREC), located in Sheridan, WY. Sheridan College and the UW SREC are located 25 miles south of the Crow Indian Reservation, and 60 miles south of LBHC. Wyoming is the 10th largest state by area in the U.S. (253,337 km2), but ranks as the 50th largest state in the U.S. in terms of population (532,668 residents). The SC, LBHC, and the UW SREC campuses are isolated in rural areas with the nearest small urban areas of Billings, MT and Casper, WY located approximately 120-150 miles away. Therefore, the overwhelming majority of students entering SC or LBHC are local students living within a 150 mile radius, thus making student recruitment efforts critical to the sustainability of regional agricultural science programs.

The SC Agriculture program offers instruction, certificates, the Associate of Applied Science degree, and the Associate of Science degree in agricultural science, agricultural business, horticulture, and food and meat science. Little Big Horn College is a public two-year tribal college chartered by the Crow Tribe and is a 1994 Land-Grant College. Little Big Horn College initiated an Associate of Science in Agriculture degree program in 2006 focusing on animal science and range management and also offers an Associate of Science in Science degree focusing on tribal natural resources and environmental science.

The goal of the SC Agriculture Program is to recruit, retain, and graduate 20 students majoring in each major discipline of agricultural science, agricultural business, horticulture, and food and meat science. Prior to the student internship and mentorship program, the SC Agriculture Program was not meeting the goal enrollment in the Agricultural Science Program and enrollment was particularly low in the Agricultural Science, Food and Meat Science, and Horticulture Programs.

At the beginning of the student internship and mentorship program, there were a total of 46 declared majors in the SC Agriculture Program. Of these student's declared majors, 20 listed agricultural business, 12 listed agricultural science, seven listed food and meat science, and seven listed horticulture. While the agricultural business program is at goal enrollment, the SC Agriculture Program currently sits at 58% of the total declared major goal of 80 students. Agricultural business was at 100% of goal enrollment, agricultural science was at 60% of goal enrollment, food and meat science was at 35% of goal enrollment, and horticulture was at 35% of goal enrollment. Therefore, efforts were needed to increase the number of students entering into the low enrollment agricultural science degree programs.

The goal of the LBHC Agriculture Program is to recruit, retain, and graduate twenty students majoring in agricultural science. The LBHC Agriculture Program was first offered during the fall 2006 semester with a beginning enrollment of four students. Prior to the student internship and mentorship program, the LBHC Agriculture Program was at 20% of goal enrollment. The LBHC also offers an Associate of Science in Science degree focusing on tribal natural resources and environmental science with a goal of 20 declared majors. There were eight students listing tribal natural resources and environmental science as their declared major. This equaled 40% of goal enrollment for the AS degree in tribal natural resources and environmental science option. There was a need for student recruitment and retention for the LBHC Agriculture Program.

The UW Agriculture Experiment Station goals are to provide the following: an agricultural system that is highly competitive in the global economy, a safe and secure food and fiber system, a healthy and well-nourished population, a greater harmony between agriculture and the environment, and enhanced economic opportunity and quality of life for the public. The UW SREC conducts research and extension programs under the direction of the UW SREC Director and UW faculty and academic professionals in the Departments of Plant Sciences, Animal Science, and Renewable Resources focusing on forage crop production, horticulture, and environmental science.

Program Description and Methods

An Advisory Committee consisting of the Program Director, the co-Program Director, one faculty from SC, one faculty from LBHC, and one faculty from UW was created at the beginning of the program. The Advisory Committee interviewed student applicants, evaluated student intern performance, and monitored student research project progress. The goal was to hire approximately five high school juniors, seniors, or incoming college freshman students during each of the two summers for a total of ten student research interns. Once hired, the students were assigned to a UW agricultural science faculty mentor and a UW graduate student mentor. The faculty mentors directed and supervised the intern throughout the duration of the summer internship. With assistance from their faculty and graduate student mentor, the student interns created and submitted a brief proposal for their summer research project to their faculty mentor. In addition to their research project, student interns were responsible for submitting a weekly work log detailing their weekly research and work progress to the Program Director. Students attended regular training sessions to help prepare them for their academic careers. These interactive training sessions included: personal responsibility, teamwork, leadership, personal financial responsibility, research ethics, developing oral and poster presentations, agricultural entrepreneurship, and agriculture and world hunger. At the conclusion of the internship, student interns were responsible for submitting a final research report to the Advisory Committee. Also, the student interns were responsible for creating a poster or oral presentation to present their research findings to the Advisory Committee and other invited faculty, students, and guest at the student research symposium at Sheridan College. Student interns were encouraged to compile their research finding into a print article for submission to a scientific journal, trade magazine, or other publication. Student interns were also encouraged to travel to at least one national meeting to report on their research findings. Lastly, the student interns all completed a field trip to Sheridan College to tour the campus, classrooms, and facilities.

A mixed methods approach (Creswell, 2008) was used where both quantitative and qualitative data was collected and analyzed to evaluate participant's perception of the program (Plano Clark, 2010). The student interns (n = 27) were given identical pre and post-internship survey assessing the student's level of knowledge and attitudes of agricultural science and the effectiveness of the internship program on their future academic and career choice. Undergraduate students (n = 29) who were not hired and did not participate in the internship and mentorship program were also pre-surveyed. The survey instrument used in this work was based upon the instrument developed by Dyer et al. (1996). The surveys collected both qualitative and quantitative data through the use of descriptive survey questions, Likert-type scale questions (where 1 = strongly disagree, 2 = disagree, 3 = uncertain, 4 = agree, and 5 = strongly agree), and open-ended questions where students were able to give open, non-guided responses. Quantitative data was analyzed using SAS 9.1 software (SAS Institute, Cary, NC) using PROC CORR and PROC GLM. Reliability of the survey instrument was determined by estimating internal consistency by computing Cronbach's Alpha (0.73). Qualitative data was collected similar to the assessment techniques of Klein et al. (2007) in their evaluation of a service learning and mentoring program through journaling and interviews. Qualitative data was recorded by participants through completion of weekly work log journals. At the completion of the internship program, participants were interviewed and responded to open-ended questions where they were free to give non-guided responses to assess their perceived effectiveness of the program and their expected academic goals. Qualitative data was analyzed by merging results via discussion through corroboration or divergence with quantitative data (Creswell and Plano Clark, 2007). This study was deemed exempt under federal regulation 45CFR §46.101(b) (U.S. Department of Health & Human Services, 2009).

Results and Discussion

Descriptive Results

A total of 27 student interns participated in program from of 2006 to 2008. Five students participated in 2006, eight students participated in 2007, and 14 students participated in 2008. Fifteen students were female and 12 students were male. Four students identified themselves as Native American, 22 students identified themselves as Caucasian, and one student identified themselves as Hispanic. Seven students were high school juniors, nine students were high school seniors, and 11 students were college freshman. Participant's cumulative high school GPA ranged from 1.4 to 4.0. Twenty-three of the students had completed the ACT exam at the time of their internship with scores ranging from 18 to 32. Fourteen participants reported that had never taken agricultural classes during high school while 13

participants reported that they completed at least one agricultural class during high school. Twenty-nine students who did not participate in the student internship program were also surveyed and served as a non-participant pre-survey group. Of these 29 non-participants, eight worked at the UW SREC as part-time student workers and 21 applied for the internship program, but were not hired.

Quantitative Results

A pre- and post-survey was given to each student internship and mentorship program participant, as well as non-participants that were not hired for the program, to assess their perceptions of agricultural science. There was no significant difference between student internship and mentorship program participants and non-participants responses for quantitative data in the pre-survey (data not shown). There was a significant difference between student internship and mentorship program participant's pre- and post-survey results (Table 1). After completing the summer internship and mentorship program, student interns mean responses changed from "uncertain" to "strongly agreed" that "agriculture is a scientific area of study" and "agriculture is a blend of scientific principles and agricultural practices." Student intern participants mean responses changed from "uncertain" to "agreed" that "studying agriculture is important." Both pre-and post-survey results indicated that participants disagreed with the statement that "only students with farm backgrounds should pursue careers in agriculture." Since there was no significant difference between participant and non-participant pre-survey results, but there was a significant difference between pre- and post-survey results, it can be concluded that participant's perception of agriculture and agricultural science changed after completing the internship and mentorship program (Table 1). These results are similar to those reported by Grossman et al. (2010) whereby students who participated in an agroecology summer experiential learning program reported increased knowledge, skills, and interest in sustainable agriculture research and careers after completing the program. Similar summer research and internship programs could have great potential to recruit students into agricultural science degree programs and careers.

Table 1. Summer Research Internship and Mentorship Program Participants (n = 27) Perceptions of Agriculture before and after Completing the Internship Program

Statement	Pre-internship results		Post-internship results	
	Mean[z]	SD	Mean	SD
Agriculture is a scientific area of study.	3.5	0.9	4.7***[y]	0.5
Agriculture is a blend of scientific principles and agricultural practices.	3.5	0.6	4.7***	0.5
Agriculture is a highly technical field of study.	3.2	0.6	4.0***	0.5
The perception of agriculture is improving.	3.3	0.7	3.4 NS	1.0
Only students with farm backgrounds should pursue careers in agriculture.	1.9	0.8	1.7 NS	0.5
Studying agriculture is important.	3.5	0.8	4.2*	0.8

[z] Means are based upon a five-point Likert-type scale where 1 = strongly disagree, 2 = disagree, 3 = uncertain, 4 = agree, and 5 = strongly agree.
[y] *, **, and *** indicate significance at P = 0.05, 0.01, and 0.001, respectively; NS indicates no significant difference.

Qualitative Results

The most common participant theme identified in the qualitative post-internship surveys and weekly work journals was increased knowledge of research and the science of agriculture. Many students noted that the favorite part of the internship program was being involved in research projects. For example, one student stated "I learned a lot about testing things, the scientific part of it," another stated "I learned a lot about horticulture and the science," while another stated "I liked the turf projects out at the Powder Horn and the equestrian center; I liked taking pictures and understanding the research out there," another stated "I really enjoyed the experiments up at the turf [sic], I really liked that, finding problems out and experimenting with things" and one student stated they liked "taking grass samples, water samples, and soil samples." This is supported by the quantitative results whereby student interns mean responses changed from "uncertain" to "strongly agreed" that "agriculture is a scientific area of study" after completing the summer internship and mentorship program.

Every student participant stated that they would recommend the internship and mentorship program to other students. Common student responses included "I would definitely recommend it," "It's a good work experience," "It is a really good program," "It was really cool," and "I would, especially if they thought they might like ag, to get a feel for it." However, students had several suggestions when asked for ideas to help improve the internship and mentorship program for future students. The most common theme was students wished they had more time to prepare and conduct their research project during the summer. Many agricultural science research projects take two or more years to complete, yet students were only hired to work for up to 12 weeks during the summer for this program. One student stated "It was really hard to juggle work time and research time" and another stated "I think we should

have more focused assignments because there is so much research being done here." Student participants in this program worked on several research projects in addition to their own, which likely contributed to the perceived lack of time and understanding during their research internship and mentorship experience. This corresponds with student assessment for an experiential learning project by Grossman et al. (2010) where mentored comparison group student participants also stated they did not understand all the research projects going on during the summer. For future projects, mentors should take measures to ensure that students have enough time to work on research projects and that they thoroughly understand the goals and objectives of any research project in which they participate.

Participant Tracking

At the end of the program, students were surveyed to assess whether they decided to pursue agricultural science majors in a college or university and a total of 14 students responded. Four student interns decided to attend SC and major in agricultural science. Four student interns decided to attend LBHC and major in agricultural science. One student decided to attend UW and major in agricultural science while one student decided to attend UW and major in engineering. One student decided to enter the military. The remaining three students were high school seniors and reported that they planned to attend college the following year. Of the three high school seniors, one plans to major in agricultural science at SC and the other two plan to major in premedicine at UW. Of the students who responded that they were attending a college or university and majoring in agricultural science, four are Native American (three females and one male), one is Hispanic (female), and four are Caucasian (four females).

Summary

This research and internship program was successful in exposing underrepresented students to the world of agricultural science and research. Of the 27 participants, 16 were from underrepresented groups. Fifteen female students, including three Native American students and one Hispanic student, and one Native American male student were able to participate in this program. Student participants reported increased knowledge of agricultural science and research and that they would recommend this program to other undergraduate students. Students also noted that they did not gain detailed knowledge of all research projects that they participated in during the summer and that they felt there was not adequate time to complete their research projects during one summer. Similar programs can be successful to expose students to agricultural science and research, but should properly plan to ensure that students are not overwhelmed by the research process. If students are asked to participate in several research projects, mentors should ensure that participants have an understanding of the goals, objectives, and related hypotheses of each research trial. Future undergraduate research internship programs should seek to engage students in research activities over a longer period of time (one year or more) rather than for just one semester or one summer. This approach could enable students to gain a thorough understanding of the research process and allow for a more detailed research internship and mentorship program.

Literature Cited

Cannon, J.G., T.W. Broyles, and J.H. Hillison. 2006. The role of agriculture in reaching gifted and talented students. NACTA Journal 50(3): 2-7.

Coker, J.S. and E. Davies. 2002. Involvement of plant biologists in undergraduate and high school student research. Jour. Nat. Res. Life Sci. Educ. 31: 44-47.

Creswell, J.W. 2008. Research design: Qualitative, quantitative, and mixed methods approaches. 3rd ed. Thousand Oaks, CA: Sage Publications, Inc.

Creswell, J.W. and V.L. Plano Clark. 2007. Designing and conducting mixed methods research. Thousand Oaks, CA: Sage Publications, Inc.

Dyer, J.E., R. Lacey, and E.W. Osborne. 1996. Attitudes of University of Illinois College of Agriculture freshmen toward agriculture. Jour. Agr. Educ. 37(3): 33-42.

FAEIS. 2005. Student surveys by discipline. Food and Agricultural Education Information System. http://faeis.ahnrit.vt.edu. Blacksburg, VA. Accessed May 4, 2010.

Fenwick, J.F. and S.J. Gartin. 1990. Assessment of experiential education. NACTA Journal 34(1): 23-25.

Goecker, A.D., J.L. Gilmore, E. Smith, and P.G. Smith. 2005. Employment opportunities for college graduates in the U.S. food, agricultural, and natural resources system: 2005-2010. (CSREES Publication). West Lafayette: U.S. Dept. of Agriculture and Purdue University.

Grossman, J.M., M. Patel, and L.E. Drinkwater. 2010. Enhancing undergraduate agro-ecological laboratory employment through experiential learning. Jour. Nat. Res. Life Sci. Educ. 39: 31-39.

Klein, C.H., O. Reyes, and J.R. Koch. 2007. A service-learning project involving multiple service projects including the mentoring of younger at-risk youth. NACTA Journal 51(4): 55-61.

Krasny, M.E. 1999. Reflections on nine years of conducting high school research programs. Jour. Nat. Resour. Life Sci. Educ. 28:17-23.

Lopatto, D. 2008. Exploring the benefits of undergraduate research experiences: The SURE survey. In: Taraban, R. and R.L. Blanton (eds.) Creating Effective Undergraduate Research

Programs in Science. New York, NY: Teachers College Press.

Plano Clark, V.L., A.L. Garrett, and D.L. Leslie-Pelecky. 2010. Applying three strategies for integrating quantitative and qualitative databases in a mixed methods study of a nontraditional graduate education program. Field Methods 22(2): 154-174.

Retallick, M.S. and M.L. Pate. 2009. Undergraduate student mentoring: What do students think? NACTA Journal 53(1): 24-31.

Retallick, M.S. and C. Steiner. 2009. A model for implementing a college-wide experiential learning program in higher education. NACTA Journal 53(1): 2-6.

Taraban, R. 2008. What is undergraduate research and why should we support it? In: Taraban, R. and R.L. Blanton (eds.) Creating Effective Undergraduate Research Programs in Science. New York, NY: Teachers College Press.

U.S. Census Bureau. 2005. Survey of income and program participation. http://www.census.gov/sipp/. U.S. Census Bureau, Washington, D.C. Accessed May 4, 2010.

U.S. Department of Health and Human Services. 2009. Basic HHS policy for protection of human research subjects. http://www.hhs.gov/ohrp/humansubjects/guidance/45cfr46.htm#46.10. U.S. Department of Health and Human Services, Washington, D.C. Accessed August 26, 2010.

Woirhaye, J.L. and D.J. Menkhaus. 1996. Undergraduates in research: Two perspectives. NACTA Journal 40(4): 17-20.

Strengths and Weaknesses of Land-Grant Two-Year Technical Agriculture Programs as Perceived by Program Directors

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Abstract

For this study, a census of Technical Agriculture Association (TAA) members was conducted to gather perceptions of six categories; 1) Problems, 2) Issues, 3) Strengths, 4) Weaknesses, 5) Faculty Concerns, and 6) Support, as they relate to two-year technical programs that specialize in agriculture. According to respondents, the greatest problems facing technical agriculture programs are that industry need for graduates continually exceeds the number of graduates and high school counselors do not view technical agriculture programs as valuable as B.S. programs. The greatest issue is with research and scholarly literature focused on technical agriculture programs. The greatest strength of technical agriculture programs is their association with a land-grant university. The greatest weakness is the fact that technical agriculture programs are viewed as second class programs at the land-grant institutions. Directors perceive that faculty are most concerned about students entering the program lacking basic mathematical skills. On the issue of support for technical agriculture programs, directors strongly agreed that industry has a great interest in hiring the technical graduate. Some resulting recommendations are to maintain and strengthen relationships with industry, develop proactive recruitment plans, and increase admission standards.

Introduction

Only half of students who attend a four-year institution or two-year transfer institution, meaning a college that offers freshman and sophomore level coursework with the intent that students transfer to a four-year university upon completion, actually graduate with a degree. Of those graduates, half will take a position for which they are over qualified (Gray and Herr, 2006). These statistics speak for the need of two-year technical programs from both a workplace, and student standpoint. With a mere 10% of high school students completing college and obtaining a suitable job (Gray and Herr, 2006), there is plenty of room for technical programs to attract students. According to a report from the National Center for Education Statistics, during the period from 1990-2005 a higher percentage of post-secondary students were pursuing courses related to career fields over academic areas, but there were no measurable changes in overall student enrollment in occupational education during that time (Levesque et al., 2008).

According to the Bureau of Labor Statistics (2010), occupations in a category with some postsecondary education are expected to experience higher rates of growth than those in an on-the-job training category. Occupations in the associate degree category are projected to grow the fastest, at about 19%. In addition, occupations in the bachelor's degree category are expected to grow by about 17% (Bureau of Labor Statistics, 2010).

There are ten land-grant institutions that have two-year post-secondary educational programs as part of their academic offerings. Two year programs are often attractive to students who are interested in furthering their education and gaining workplace skills but are not interested in or academically prepared to earn a four-year bachelor's degree (Duncan, 2004). Career related courses in technical agriculture programs tend to utilize hands-on learning environments to enhance students' development of workplace skills (Virginia Polytechnic Institute and State University, 2009).

Many of the students that enter these programs can be classified as having concrete sequential and/or concrete random learning styles. Orr et al. (1999)

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found that the majority of postsecondary students in trade and industrial technical programs were concrete sequential or concrete random. Concrete sequential students relate best to the physical, hands-on world and think in ways that are methodical, ordered, and predictable while concrete random learners are intuitive and more easily transition from fact to theory (Gregorc, 1982). These findings are supported by Myers and Dyer (2006) who found that a very high percentage of the postsecondary students they studied were concrete sequential and concrete random. Myers and Dyer (2006) concluded that their findings supported the contention that individuals studying agriculture tend to exhibit ordered and problem specific learning styles. Hence, the hands-on learning environment offered at agriculture technical schools is an attractive option for students.

Not only is the learning environment a draw for students, but there is evidence that students benefit from a job market desiring employees with technical skills. As stated by Gray (2000), there was increased job demand in the United States for high skill areas and significant numbers of four-year college graduates being underemployed. The utility of two-year technical programs was ever increasing. The same holds true today according to Carolyn Curtis, Hudson Valley Community College's Vice President for Academic Affairs. "Two-year schools that are focusing on training students for well-paying jobs in technical fields and other high-demand areas are positioned well to help rebuild the economy" (Cooper, 2010).

As the need for these technical programs grows, it is important for Program Directors to be aware of issues and concerns not only of their own programs, but of technical agriculture programs nationwide. Many may argue that the land-grant system should not only train future scholars with bachelors, masters and/or doctoral degrees, but should provide technical curriculum to train an ever increasing work force to meet the needs of the 21st century.

Every land-grant institution was created with the "industrial class" in mind (Herren and Hillison, 1996). One of the purposes of the land-grant institution is to serve the people of the state by traditional or non-traditional methods. One method of meeting the needs of the state is the inclusion of two-year programs (Kantrovich, 2000). If the needs of the people are not being met, then the land-grant mission is not being fulfilled (Morrill Land-Grant Act, 1862; NASULGC, 1995).

To fulfill this need, technical agriculture Program Directors met in 1994 and formed the Technical Agricultural Association (TAA). The TAA members have met annually to discuss items of mutual interest. The TAA members decided to conduct a study that would identify the TAA Program Directors' perceptions of the strengths and weaknesses of their respected programs. The following institutions have actively been involved in TAA functions: Agriculture Institute – North Carolina State University, Agricultural Technical Institute – The Ohio State University, Agricultural Technology Program – Virginia Polytechnic Institute and State University, Farm and Industry Short Course – University of Wisconsin, Institute of Agricultural Technology – Michigan State University

Institute of Applied Agriculture – University of Maryland, Nebraska College of Technical Agriculture – University of Nebraska, Ratcliffe Hick School of Agriculture – University of Connecticut, Stockbridge School of Agriculture – University of Massachusetts, and Thompson School of Applied Science – University of New Hampshire

According to Bryson (1988), effective assessment should provide several benefits to an organization: "among the most important is that it produces information vital to the organization's survival and prosperity" (p. 120). Birnbaum (1988, p. 42) states "understanding the environment is critical, because organizations have vital continuing and mutual transactions with elements outside their boundaries." By better understanding the perceptions of Program Directors, steps can be taken to address the needs of technical agriculture programs and their stakeholders.

Purpose and Objectives

The purpose of this descriptive study was to determine the Program Directors' perceptions of technical agricultural programs at land grant institutions in terms of problems, issues, strengths, weaknesses, faculty concerns, and degree of support. The following objectives guided this study:

1. Describe the agriculture programs at the institutions involved;
2. Describe Program Directors' perceptions of problems facing technical agriculture programs;
3. Describe Program Directors' perceptions of issues facing technical agriculture programs;
4. Describe Program Directors' perceptions of strengths of technical agriculture programs;
5. Describe Program Directors' perceptions of weaknesses of technical agriculture programs;
6. Describe Program Directors' perceptions of concerns of faculty who teach technical agriculture courses; and
7. Describe Program Directors' perceptions of the degree of support given to technical agriculture programs.

Materials and Methods

This study is descriptive in nature. Data was gathered using an online questionnaire designed by administrators and faculty who direct programming and teach courses in a two-year associate degree program at a land-grant university. Questions were divided into six constructs; 1) problems, 2) issues, 3) strengths/advantages, 4) weaknesses/disadvantages,

5) faculty concerns, and 6) program support. Participants were asked to indicate their level of agreement with statements using a Likert-type scale where 1=strongly agree to 5=strongly disagree. Respondents were also given the opportunity to select "not-applicable" for statements that did not apply to them. Demographic data was also collected. The population of this study was the membership of the Technical Agriculture Association (TAA) which consisted of the Program Directors from the aforementioned institutions. Eight of the 10 members completed the questionnaire for a response rate of 80%. Non-respondents were not contacted to determine if differences existed between respondents and non-respondents. Means and standard deviations were calculated in Excel to determine the ranking and significance of each statement.

Results and Discussion

Objective One: Describe the programs offered by the institutions represented in this study.

Both one and two year programs were offered by the institutions. The one year programs required an average of 30 semester hours to complete while the two year programs required 61.5 semester hours, on average. Internships were required by 75% of institutions and were awarded an average of four semester hours toward program completion. Respondents indicated that 86% of institutions offer classes that transfer to a B.S. degree program. At those institutions, 75% of credits earned were transferable credits. Of faculty employed in these programs, 60% were full time employees and the average salary for all employees was $49,500. Responses indicated that 38% of institutions employ tenure-track faculty. The average years of experience for faculty were 15 years.

Objective Two: Determine Program Director's perceptions of problems facing technical agriculture programs. Of the twenty problem statements

Table 1. Program Directors' Agreement Levels with Statements about Problems Facing Technical Agriculture Programs (N=8)

Statement	*M*	*SD*
Demand for graduates exceeds graduation numbers	1.38	0.52
High school counselors do not view the technical agricultural program as valuable as the BS program	1.38	0.52
Federal funds not earmarked for research on technical agricultural programs	1.50	0.93
Emphasis placed on the four-year program at the expense to the technical agricultural program	2.25	1.16
Level of state financial support provided for the program	2.29	0.95
Level of university financial support provided for the program	2.50	1.07
Image of the technical agricultural programs on campus less than positive	2.63	1.30
Distribution of college resources favors the four-year program	2.63	1.30
Faculty members not rewarded financially at an appropriate level	2.63	1.19
Graduation rate of students	2.63	1.51
College faculty assigned to other departments who teach in the technical agricultural programs question the value of this level of education	2.67	1.63
Inadequate number of students enrolling in the program	2.75	1.28
Securing qualified full-time faculty to teach courses	2.88	1.13
Inadequate infrastructure to support an effective program	2.88	1.13
Administrators of technical agricultural programs not included in some college administrative meetings/functions	3.00	1.20
Funding provided by the state not earmarked for the program	3.00	1.58
High school agricultural teachers do not view the technical agricultural program as valuable as the BS program	3.25	1.28
Securing qualified part-time faculty to teach courses	3.50	1.20
Course content taught too theoretical	4.00	1.41
Students lack opportunity in the curriculum to apply what is learned	4.13	1.13

Note. Scale: 1= strongly agree, 2= agree, 3= neutral, 4=disagree, 5= strongly disagree.

Table 2. Directors' Agreement Levels with Statements about Issues Facing Technical Agriculture Programs (N=8)

Statements	*M*	*SD*
Research and scholarly literature focused on technical agricultural programs	2.00	1.00
Majors or options offered in technical agricultural programs being on the cutting edge of technology	2.13	0.64
Communication between technical agricultural programs at land-grant institutions	2.13	0.99
Curricular focus of technical agricultural programs emphasizing multi-regional employment needs	2.13	0.64
The Technical Agricultural Association (TAA) reaching out to other technical agricultural programs at land-grant institutions that are not associated with TAA	2.25	0.71
Department heads in the college support the technical agricultural program as an important academic offering of the college	2.25	1.04
Teaching methods used in technical agricultural courses	2.25	0.71
Students diversity in technical agricultural programs	2.38	0.92
Transfer of credits into four-year bachelor degree programs	2.38	1.51
Curricular focus of technical agricultural programs emphasizing state employment needs	2.38	0.92
Level of course content taught to the students enrolled in the technical agricultural program	2.50	1.07
Accreditation for technical agricultural programs	2.50	0.93
Curricular focus of technical agricultural programs emphasizing international employment needs	2.50	0.93
Faculty in technical agricultural programs having tenure and rank	2.57	1.51
Faculty diversity in technical agricultural programs	2.63	1.19
TAA reaching out to other educational institutions offering technical agricultural programs	2.63	0.92
Technical agricultural programs being located at land-grant institutions and not at community colleges	2.88	1.36
Appropriateness of specific course content taught for mid-management/technician level jobs in the industry	2.88	1.13
Admission standards for technical agricultural programs	2.88	1.13
Technical agricultural program faculty involvement in college governance organizations/committees	2.88	1.13
Rigidity in course requirements for completion of the program	3.00	1.20
Department heads in the college encourage their faculty to teach courses in the technical agricultural program	3.14	1.21

Note. Scale: 1= strongly agree, 2= agree, 3= neutral, 4=disagree, 5= strongly disagree.

included in the questionnaire, respondents agreed that six were current problems facing programs (Table 1). The demand for graduates exceeds graduation numbers and guidance counselors do not view the technical program as valuable as the BS program were statements directors strongly agreed with (M=1.38). Other statements agreed upon as problems included: federal funds not earmarked for research in technical agriculture programs (M=1.50); emphasis placed on the four-year program at the expense to the technical agriculture program (M=2.25); and level of state financial support provided for the program (M=2.29).

Objective Three: Describe Program Director's perceptions of issues facing technical agriculture programs. Respondents indicated agreement with ten of the 22 statements (Table 2). The four issues directors agreed most strongly with were: research and scholarly literature focused on technical agriculture programs (M= 2.00); majors or options offered in technical agricultural programs being on the cutting edge of technology (M=2.13); Communication between technical agricultural programs at land-grant institutions (M=2.13); and Curricular focus of technical agricultural programs emphasizing multi-regional employment needs (M=2.13). The issue which garnered the lowest level of agreement was: department heads in the college encourage their faculty to teach courses in the technical agricultural program (M=3.14).

Objective Four: Describe strengths of technical agriculture programs. The strengths portion of the questionnaire held 14 statements. Four statements earned mean responses of strongly agree. These were 1) association with the land grant university (M= 1.13), 2) laboratories that are part of the curriculum (M= 1.13), 3) students not admissible to the BS program can attend agricultural classes on the land-grant campus (M= 1.13), and 4) placement rates of program graduates (M= 1.38). Respondents agreed that all statements were strengths of technical agriculture programs (Table 3).

Objective Five: Describe perceptions of weaknesses of technical agriculture programs. This section of the questionnaire included eight statements (Table 4). Respondents strongly agreed with the following statements: technical agriculture programs viewed as second class programs at the land-grant institution (M= 1.38); technical agricultural students viewed as second class citizens at the land-grant institutions (M=1.50); and other faculty at the institution sees the technical program as less important than other academic programs in the college (M=1.88).

Objective Six: Describe perceptions of Program Directors of technical agriculture programs related to faculty concerns. The faculty concerns section of the questionnaire consisted of eighteen statements. Respondents were in agreement with five statements concerning faculty in technical agriculture programs: 1) students enter the program lacking basic math skills (M= 1.50); students enter the program lacking basic grammatical skills (M= 1.63); 3) student attendance in class (M= 2.25); sufficient operating dollars to teach lecture/laboratories (M= 2.25); and faculty dedicated to teach in the technical program are not compensated adequately, as compared to faculty who are assigned from other departments to teach specific courses (M= 2.25).

Table 3. Directors' Agreement Levels with Statements about Strengths of Technical Agriculture Programs (N=8)

Statements	*M*	*SD*
Association with the land-grant university	1.13	0.35
Laboratories that are a part of the curriculum	1.13	0.35
Students not admissible in the BS program can attend agricultural classes on the land-grant campus	1.13	0.35
Placement rates of program graduates	1.38	0.52
Agricultural industry support of the program	1.50	0.53
Technical agricultural program's ability to provide industry with trained personnel in a relatively short period of time	1.50	1.07
Student's ability to obtain a degree or education in a relatively short period of time as compared to a four-year commitment	1.50	0.76
Internships that are required in technical agricultural programs	1.50	1.07
Students in technical programs can receive more applicable skills than students in BS degree programs	1.50	1.07
Provides students with the opportunity to attend further education	1.63	1.06
Technical agricultural program's ability to adjust the curriculum quickly to changing needs and new technologies	1.75	1.16
Technical agricultural programs ideal for individuals who want to work in mid-management or technical fields	1.75	0.89
Technical agricultural graduates remain in their home state after graduation to a greater degree than the four-year graduates	2.00	1.20
Starting salaries of program graduates comparable to BS graduates	2.13	0.64

Note. Scale: 1= strongly agree, 2= agree, 3= neutral, 4=disagree, 5= strongly disagree.

Table 4. Directors' Agreement Levels with Statements about Weaknesses of Technical Agriculture Programs (N=8)

Statements	*M*	*SD*
Technical agricultural programs viewed as second class programs at the land-grant institutions	1.38	0.74
Technical agricultural students viewed as second class citizens at the land-grant institutions	1.50	0.76
Other faculty at the institution sees the technical program as less important than other academic programs in the college	1.88	1.25
The brevity of the program lacks the time to develop the "whole" student	3.13	0.83
Curricular aspects of the program lack liberal arts courses	3.13	0.99
Curricular aspects of the program lack communication courses	3.43	1.13
The agricultural industry views the technical program as a source of cheap labor	4.13	0.83
The agricultural industry fails to see the quality of the technical agricultural program	4.25	0.71

Note. Scale: 1= strongly agree, 2= agree, 3= neutral, 4=disagree, 5= strongly disagree.

Respondents disagreed that students leave the program with too little skill preparation (M=4.00) and programs should require more courses/credits for completion (M=4.00). All 18 statements, means, and standard deviations are listed in Table 5.

Table 5. Directors' Agreement Levels with Statements about Concerns of Faculty Teaching Technical Agriculture Courses (N=8)

Statements	*M*	*SD*
Students enter the program lacking basic mathematical skills	1.50	0.53
Students enter the program lacking basic grammatical skills	1.63	0.52
Student attendance in class	2.25	1.04
Sufficient operating dollars to teach lecture/laboratories	2.25	1.04
Faculty is expected to engage in some type of scholarly work	2.50	1.20
Quality of laboratories/facilities in which courses are taught	2.50	0.76
Students behavior in class	2.88	0.99
Faculty finds it difficult to develop new educational technology skills	3.00	1.31
Faculty dedicated to teach in the technical program are not compensated adequately, as compared to faculty who are assigned from other departments to teach specific course(s)	3.00	1.26
Faculty finding the appropriate text resources for courses taught at the technical level	3.13	1.64
Resources are diverted to other programs in the college from the technical programs	3.13	1.36
Faculty is expected to engage in some type of research	3.25	1.39
Technical agricultural programs are expected to become involved in distance education	3.38	0.92
Students enter the program lacking the basic computer skills	3.38	1.19
Faculty finds it difficult to stay current in their specialty areas	3.75	1.04
Faculty who teach in the program have a less than a positive attitude about the program	3.88	0.83
Students leave the program with too little skill preparation	4.00	1.07
Programs should require more courses/credits for completion	4.00	1.07

Note. Scale: 1= strongly agree, 2= agree, 3= neutral, 4=disagree, 5= strongly disagree.

Objective Seven: Describe perceptions of directors of technical agriculture programs relating to support given technical agriculture programs. The support section of the questionnaire included five statements (Table 6). Respondents indicated strong agreement with the following statement: industry has a great interest in hiring the technical graduate (M= 1.25). Respondents did not agree that industry support for the program is not as strong as it has been in the past (M= 3.63).

Table 6. Directors' Agreement Levels with Statements about the Degree of Support for Technical Agriculture Programs (N=8)

Statements	*M*	*SD*
Industry has a great interest in hiring the technical graduate	1.25	0.46
Industry provides scholarships to the students	1.50	0.76
College provides scholarships to the students	1.75	0.71
Industry willing to lease/loan/donate equipment or other in-kind support (seeds, plants, etc.)	2.13	0.99
Industry support for the program is not as strong as it has been in the past	3.63	0.74

Note. Scale: 1= strongly agree, 2= agree, 3= neutral, 4=disagree, 5= strongly disagree.

Summary

The findings of this study support the idea that technical agricultural programs are producing a qualified workforce that is strongly supported by the agricultural industry through scholarship programs and hiring practices. While the programs have a favorable image with industry, directors expressed concern with the image of their programs on the land-grant campus in comparison with bachelor degree programs. There is a perception that the students and programs are not held in as high esteem by other faculty in the college as the four-year programs. However, it is evident that graduates are in high demand and the job market would support expansion of technical agriculture programs.

Industry benefits from a highly qualified workforce in part due to the high value placed on laboratory-based instruction throughout the curriculum which provides students with skills valuable for job placement. However, problems were identified with newly admitted students lack of academic skills; most notably in mathematics and grammar. In order to address these concerns and expand recruitment efforts to grow programs, the directors agreed that more financial support should be provided for the programs from both state and university funds. The directors also agreed that the lack of research and scholarly literature focused on technical agricultural programs is an issue that needs attention.

From these findings, several recommendations have been developed for action by directors of technical agriculture programs and for further research. It is recommended that directors of technical agriculture programs continue to maintain and strengthen relationships with agricultural industry leaders. The findings of this study suggest that industry is a major supporter of these technical programs, depend on them as a source of skilled employees. The fact that there are continually more jobs than graduates hints at a need for further partnership to make sure students are learning the best technical skills for the available jobs and also to reinforce recruiting efforts to attract students into technical programs and industry positions.

Technical agriculture programs should not only develop more proactive and positive recruitment plans, but should also establish higher standards for incoming students to address the concerns about new students' skills in math and grammar. With the demand for technical program graduates, it is not desirable to change admission standards in a way that will significantly diminish acceptance rates. However, to address concerns about poor academic performance, tutoring, mentoring, and on campus study aid resources should be well advertised. Also, if

admission standards are increased, the change should be well advertised at the high school level to encourage potential students to develop those academic skills prior to graduating high school and applying for admission into a technical agriculture program. In addition, alternative remediation programs or online tutorials should be investigated as to their effectiveness in improving skills of students with regard to math and grammar prior to or upon admission into technical agriculture programs. Addressing this issue will not only result in better prepared students but will also reduce class time spent going over these fundamentals so more time can be spent on skills content.

In addition to student issues, concerns about research should also be addressed. Faculty in technical agriculture programs should consider not only collaborative research with other technical agriculture faculty, but also with other departments in the college that have common interests and concerns. In addition, research is needed to determine why perceptions exist that the technical agriculture program is less valuable than a four year program. A third avenue of research should involve follow-up studies with technical agriculture program graduates and industry personnel to assess their perceptions of the value of technical agriculture programs and provide input on curriculum upgrades that would serve needs of industry.

A final recommendation for action by directors of technical agriculture programs is the identification of outside funding sources to support research and program operations. Changes in admissions standards, recruitment strategies, and research expectations of faculty will require additional funding to be implemented successfully. Directors should advertise past successes and the industry needs that are met through technical agriculture programs to secure investment from outside sources in addition to state and university funds. Continued investment will allow technical agriculture programs to further develop and thrive and continue to supply a well-qualified work force for agriculture industry.

Literature Cited

Birnbaum, R. 1988. How colleges work: The cybernetics of academic organization and leadership. San Francisco, CA: Jossey-Bass Publishers.

Bryson, J.M. 1988. Strategic planning for public and nonprofit organizations. San Francisco, CA. Jossey-Bass Publishers.

Bureau of Labor Statistics: Occupational Outlook Handbook, 2010-2011 Edition. http://www.bls.gov/oco/oco2003.htm. U.S. Department of Labor. Accessed June 1, 2010.

Cooper, R.K. 2010. High-demand two-year degree programs attract career changers and four-year grads. http://albany.bizjournals.com/albany/stories/2010/04/19/story4.html. The Business Review (Albany). Accessed June 2, 2010.

Duncan, D.W. 2004. Knowledge and perceptions of Virginia secondary agriculture educators toward the agr.l technology program at Virginia Tech. Jour. of Agr. Education 45(1): 21-28.

Gray, K. 2000. Getting real: Helping teens find their future. Thousand Oaks, CA: Corwin Press, Inc.

Gray, K.C. and E.L. Herr. 2006. Other ways to win: Creating alternatives for high school graduates. Thousand Oaks, CA: Corwin Press, Inc.

Gregorc, A.F. 1982. An adult's guide to style. Columbia, CT: Gregorc Associates.

Herren, R.V. and J. Hillison. Agr. Education and the 1862 land-grant institutions: The rest of the story. Jour. of Agr. Education 37(3): 26-32.

Kntrovich, A. 2000. An evaluation of past performance of the two-year agr. technology program at Virginia Tech as perceived by the program graduates. Ph.D. Diss., Dept. of Teaching and Learning, Virginia Polytechnic Institute and State Univ., Blacksburg, VA. 24061.

Levesque, K., J. Laird, E. Hensley, S.P. Choy, E.F. Cataldi, and L. Hudson. 2008. Career and Technical Education in the United States: 1990 to 2005 (NCES 2008-035). National Center for Education Statistics, Institute of Education Sciences, U.S. Dept. of Education, Washington, D.C.

Morrill Land-Grant Act. 1862. U.S. statutes at large, 12, 503.

Myers, B.E. and J.E. Dyer. 2006. The influence of student learning style on critical thinking skill. Jour. of Agr. Education 47(1): 43-52.

NASULGC. 1995. The Land-Grant tradition. Office of Public Affairs, NASULGC. Washington, D.C.

Orr, B., O. Park, D. Thompson, and C. Thompson. 1999. Learning styles of postsecondary students enrolled in vocational technical institutes. http://scholar.lib.vt.edu/ejournals/JITE/v36n4/orr.html. Jour. of Industrial Teacher Education 36(4). Accessed June 27, 2009.

Virginia Polytechnic Institute and State University, College of Agriculture and Life Sciences. n.d. What is the Agri. Technology Program? http://www.cals.vt.edu/agtech/introduction.html. Virginia Polytechnic Institute and State Univ. Accessed June 6, 2010.

Agribusiness Case Study Competitions – Educational, Practical, Challenging, and Rewarding

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Abstract

Case studies are a useful tool in agribusiness management education. They attempt to illuminate a decision or set of decisions: why they were taken, how they were implemented, and with what result. A number of professional associations have developed case study competitions as a way to get students engaged with their association and support future professionals. Typically a case study competition will allow students to compete in teams – pitting them against other teams – with the teams subsequently judged for their analysis of the case and presentation of their recommendations through both written and oral communication means. This article describes the benefits to students, faculty and industry of a case study competition, and provides pointers, notes and suggestions to consider when organizing such a competition.

Introduction

Why Case Competitions?

Case studies that carefully present a company's situation and the challenges the company faces have a long history as effective teaching tools. These cases highlight economic, marketing, business, and/or other principles that require the students to apply what they have learned about selected principles. They are received well by students "because they serve as an interesting way to learn how to apply analytical tools in true-to-life agribusiness settings," (Seperich et al., 1996). Because of the desire among students to compete and win, it is no surprise that this teaching tool has also been adopted for the basis of competition between students. Often times case study competitions can be a team from one university pitted against teams from other universities. However, such a competition has also been used within a class to promote a fun way to engage students, such as in a graduate agribusiness class at Purdue University (Wang, 2009). In both cases, bragging rights are at stake, and on occasion cash awards. This competitive environment and valuable learning opportunity affords students many immediate and long term benefits. Our paper presents the fundamentals of cases and case competitions, complete with examples from current case competitions and the authors' firsthand experience with these competitions.

Definitions

Although some may consider it remedial, it is important to explicitly explain what is meant by case study and case competition within this paper so as to avoid confusion. According to Schramm (1971, p. 6), "the essence of a case study, the central tendency among all types of case study, is that it tries to illuminate a decision or set of decisions: why they were taken, how they were implemented, and with what result." In research, a case study is a way to empirically explore through observation and assessment phenomena that do not conform to statistical analysis. With respect to pedagogy, given the context of the challenges faced by the firm, students need to study the situation, assess the economic consequences and come up with the best decisions to solve the problem. Having students interject themselves as the decision maker helps "foster(s) critical thinking and reflection so that students learn how to learn on their own." (McDade, 1995, p. 9). In the agribusiness sense, these decisions are generally within the context of a food or agribusiness firm and present a situation faced by management. The case is then utilized as an example of a "hands-on" situation for students to apply their analytical and managerial skills, generally in developing strategies to address the circumstances outlined in the case.

Initial development of business oriented teaching case studies is generally attributed to the Harvard Business School. When the School was started, the faculty discovered that there were no textbooks suitable for a graduate program in business. Their first solution to this problem was to interview leading practitioners of business and to write detailed accounts of what these managers were doing. The professors could not present these cases as practices to be emulated because there were no criteria available for determining what would succeed and what would not succeed. Thus, the faculty instructed their students to read the cases and come to class

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prepared to discuss the cases and offer recommendations for appropriate courses of action.

Teaching cases are generally written with particular learning objectives in mind and are refined in the classroom before publication. Additional relevant documentation (such as financial statements, time-lines, and short biographies, often referred to in the case as "exhibits"), multimedia supplements (such as video-recordings of interviews with the case protagonist), and a carefully crafted teaching note often accompany a case study. If they are not formally part of the publication, items like teaching notes can often be obtained through the author(s).

Colorado State University has developed a good resource for information on writing and utilizing case studies. More information on case studies can be obtained from the World Association for Case Method Research and Application (WACRA). Another good source is "Case Study Research: Design and Methods," by Yin (2003).

Competition

With the growth of case study utilization as an instructional tool, there have been a number of professional associations that have developed case study competitions as a way to get students engaged with their association and support future professionals. Typically a case study competition will allow students to compete in teams – pitting them against other teams – with the teams subsequently judged for their analysis of the case and presentation of their recommendations through both written and oral communication means.

Although there are a number of competitions, a small set of examples are presented in Table 1 to highlight some concepts of case competitions. The Agricultural and Applied Economics Association (AAEA) organized their first graduate student case study competition in 1998 at their annual meetings in Salt Lake City, Utah, and the competition has been held annually since then (Graduate Student Section 2009). The Food Distribution Research Society (FDRS) organized their first case study competition in 2000, and moved to a live case competition format in 2004 (Student Food Marketing Challenge 2009). The International Food and Agribusiness Management Association also offers a case competition – but with an international focus (IAMA, 2009). The last example in Table 1 is that of the Foster School of Business at the University of Washington, where they have corporate sponsorships and use the program as a recruiting tool for their MBA program (Foster School of Business, 2010). Additional details listed in Table 1 are discussed further in the rest of this document.

Broad Benefits

Both students and faculty gain from well-structured and administered case study competitions. We discuss each group in more detail below.

Benefits to Students

Agribusiness case studies are typically a description of a real situation faced by a food or agribusiness firm. As such, they force students to practice their analytical and managerial skills and pit their thoughts and presentation skills against other teams. As with in-class use of case studies, an argument can be made that there are no "right" answers to "solve" a case study. Although true, there are definitely answers that are "more" correct and make better sense given the parameters of the case study and what we know about economics, management, finance, marketing and the rest of the managerial sciences. Additionally, how the students support their decisions is very important. Their decisions must be based on good data, sound analysis, and critical thinking.

Table 1. Examples of Case Study Competitions in the U.S.

Organization	Competition	Lead Time	Case Format*	Presentation / Q&A Time	Students Targeted (max)		
					Undergrad	Grad	Maximum
Agricultural and Applied Economics Association*	Graduate Student Section Case Study Competition	2 weeks	Paper	15/5	Not allowed	3	3
Food Distribution Research Society**	Student Food Marketing Challenge	30 Days	Live Case	15/5	5	2	5
International Food and Agribusiness Management Association***	Student Case Competition	< 1 week	Paper	15/5	4	4	4
Foster School of Business, University of Washington****	Global Business Case Competition	48 hours	Paper	15/15	4	NA[+]	4

*see: http://www.aaea.org/sections/gssnew/?p=284 and http://www.aaea.org/sections/aemnew/2010CaseStudyCompetitionRegForm.pdf
** http://fdrs.ag.utk.edu/casestudy.html and http://fdrs.tamu.edu/FDRS/Welcome.html
*** https://www.ifama.org
**** http://www.foster.washington.edu/centers/gbc/globalbusinesscasecompetition/Pages/GBCC.aspx
[+]NA = Not applicable

Students are required to apply many skills and knowledge in case competitions. These settings provide an exceptional environment for students to practice critical thinking, teamwork, division of labor, research, decision making – all occurring with a definitive deadline. These are all activities which they will face when they become employed by an agribusiness firm. Thus, students gain knowledge, solve problems, practice making presentations, and learn to use tools, which will help to hone their skills and talents. For example, students that participate in the FDRS Student Food Marketing Challenge are required to efficiently assess a situation, come up with a sound method to approach the problem, and pitch their approach playing the role of consultants bidding a job. All this work is done between 9:00am when the live case starts and 7:00pm when the first round of presentations begin. That situation is a fairly real scenario and the added time constraint really forces the students to focus on the task at hand.

Going through these types of competitions provide lasting benefits for students as they begin their careers. Whether it is the time crunch of the FDRS competition, the month long analysis in the AAEA competition, or the international exposure in the IFAMR case, students can take lessons learned into pressure situations, like interviews. In addition, during job interviews, when many college students have minimal experiences and limited topics to talk about, students who participated in case competitions have a wealth of thoughts to share about their experience. Our own students have credited their experience in case study competitions for better performance in job interviews and employers have viewed such participation and knowledge as positive. Other collegiate activities provide similar benefits, but these competitions are central to the students' career field as well as all the other life skills.

An additional benefit of participating in a case study competition is that the students can interact with executives from agribusiness firms and other industry experts (if they are utilized as judges). This interaction provides the benefit of allowing students to learn from and be guided by real life practitioners, as well as give them the opportunity for networking which may lead to internship or full-time job opportunities.

Benefits to Faculty

The benefits from competitions go beyond the students. Faculty also gain from participating in the competition. There are many ways faculty can be involved: program coordinator, case writer, coach, and judge. Program coordinator, especially for young faculty, offers leadership opportunities as well as exposure to industry. Writing the case offers the same exposure to industry as well as the potential for a published case study. There are great advantages to refining a case through a competition where many people offer feedback. That process certainly helped Gunderson et al. (2009) publish their case which was originally developed for the Food Distribution Research Society's Student Food Marketing Challenge. In addition to writing cases, coaching a team can offer great insight into a program's effectiveness. Coaching, a very humbling experience, allows one to really assess how well students have mastered topics taught in the classroom. This realization can ultimately lead to better program curriculum and better teaching skills. Finally, judging the students' presentations offers faculty the opportunity to evaluate students from other universities, and by proxy, allowing the faculty the opportunity to benchmark their university's program.

Benefits to Industry

Case studies benefit the profession of agribusiness management in a variety of ways. At the outset, the development of a case study results in a scholarly product which requires research and insight into challenges faced by management. The sponsoring of a case study competition validates the format as a method of good teaching. In addition, it heightens the awareness of the agribusiness industry to the value of the subject matter taught in our universities and the expertise and competence of our students. For the company that is the case subject, they have the opportunity to wrestle with their challenge with the case writer and potentially with the students and judges participating in the competition, depending on their involvement. One year, a company president, acting as a judge for the final round of the AAEA Graduate Student Case Competition, walked away with a strategic thought that opened up valuable opportunities for their business. Admittedly, this level of benefit is rare, but the possibility of the company thinking about their situation with fresh eyes is very real. The final benefit for industry is the opportunity to interact with students, a pre-interview screening if you will.

Case selection / Preparation

There are a number of good sources for case studies. There are books on general case studies (e.g. Drucker, 2008; Harvard Business Press, 2009) and some specific to agribusiness management (e.g. Boland and Gallo, 2009). In recent years, a number of journals have published agribusiness management case studies. Two in particular are the *Journal of Agribusiness* (published by the Agricultural Economics Association of Georgia) and the *International Food and Agribusiness Management Review* (published by the International Food and Agribusiness Association). Until recently, agricultural economists could submit cases for publication in *Review of Agricultural Economics;* however, the Agricultural and Applied Economics Association recently redirected and renamed the publication and is now offering opportunities to publish select cases in the proceedings issue of the *American Journal of*

Agricultural Economics. In addition, the Agricultural and Applied Economics Association is encouraging case submissions to the *Journal of Natural Resources and Life Sciences Education*.

Characteristics of a Good Case

A good case study competition should be comprised of the following components:

1. A good case study. Key features of a good case study include: a reasonably current topic; an interesting and realistic problem faced by an agribusiness firm; a situation/opportunity that requires the students to do both industry and firm level research; good supplements to the case study (the relevant documentation described above), and a situation that involves a bit of complexity (i.e., not just a case that focuses on human resource management or finance for example). It should be noted however, that more narrowly focused cases are important and useful for classroom use, so as to zero in on a particular area of management.

2. Recommendations/requirements for team composition. As can be seen in Table 1, case competitions can be for graduates only, undergraduates only, or a mix. The level of a case study competition is entirely the choice of the sponsoring organization. Some considerations include: if the case competition is for undergraduate students, there is obviously a larger potential target audience who might participate. Graduate students can be expected to perhaps give a more in-depth analysis and presentation – and time available for the competition may help to focus this choice. The focus of the case study competition will tend to dictate team size. Undergraduate competitions often have teams of three to four students, while graduate student competitions usually have two to three students per team. The difference is to allow for a bit more input and "hybrid vigor" in the case of undergraduates, who typically do not have as much background or experience.

3. Knowledgeable and prepared judges – these can be authors of the case study, professors or individuals from the firm involved in the case study. Whoever is recruited, they should possess some expertise that allows them to make a judgment call on student performances. These judges will have to be briefed on the case, and ideally actually have an opportunity to read the case. Finally, they will have to be instructed on how the presentations are to be graded.

4. Reasonable physical facilities for teams to make their presentations. Almost any room that can be set up lecture style will work. One key piece is to be able to shut out student teams that have yet to present. It is not fair to allow the last place team to learn from all the others that go before them.

Marketing/Recruiting

Often an overlooked aspect to hosting/conducting a case competition is marketing of the program. Without an effort to get the word out, both faculty and students will find it difficult to commit their time and resources toward the competition. Marketing is a step that pays great dividends. There are several options to consider. If the competition is taking place in conjunction with a professional conference, coordinating with the professional organization to highlight the competition in the conference brochure is a must. Most everyone planning to attend the conference will at least browse the brochure affording this spot great exposure. However, most faculty looking at the brochure will do so quickly. That means it is important to make sure the segment on the competition is very recognizable.

In addition to the conference brochure, one can work his/her professional networks. Everyone knows someone that can have an influence. By working relationships, one can recruit several teams by simple word of mouth. Professors who teach agribusiness classes should also be informed about the competition. However, no matter how good networking is, it is still limited in scope. Therefore, it is a good idea to couple the networking with advertising by either blast or targeted emails. Many times associations will be willing to email your announcement to their members as a service to the profession.

Information Sharing

There are many different formats that competitions use with respect to the information shared with teams. As seen in Table 1, it can range from sharing the case within 48 hours of the competition to having the full case for the better part of a month. The appropriate level of information shared depends on the competition's objectives. For the AAEA competition, students are expected to come in with answers to the case's challenge and thus the students need the 30 day lead time. For FDRS's competition, students are expected to only propose a method of approach to conduct the research necessary to make the case's decision. As a result, only a general topic area is revealed to the student prior to the competition, allowing students to become familiar with industries and concepts. For example, one year students competing in the Student Food Marketing Challenge were informed that the case dealt with private labeling and processed dairy products. Regardless of the format, it is important to provide the appropriate information needed for each team to prepare in such a way as to do their best work.

It is also helpful to give the students the judging guidelines. This assists them in knowing what the competition will be based on. Additionally, this also helps to focus the work of the judges – so that they know what they are looking for, and tends to level the playing field.

Judging

Criteria: Obviously, different competitions will focus on different goals and objectives and may be

Table 2. AAEA* Case Study Competition Judging Guidelines and Scoring Sheet

Category	*Description*	*Point Value*	*Team Score*
Description of the Case Situation	A brief overview of the situation found in the case should be provided. • An accurate summary of the case study firm's industry position, market environment, and business situation.	5	_____
SWOT Analysis & Industry Assessment**	In order to evaluate the case study firm's product lines and make strategic recommendations students should conduct a SWOT analysis on the two products and assess the attractiveness of each industry.	15	_____
Strategic Direction	Recommend and justify the strategic direction the case study firm should pursue in order to sustain itself in the short-term and position itself for long-term success.	25	_____
Strategy Recommendations	Recommend specific business strategies to accomplish the direction/objectives identified above. • Identify strategic alternatives and support the recommended choice(s). • Take into account implementation issues, including organizational and financial constraints.	25	_____
Ability to Address Questions	• How well did students support their recommendation? • Were they able to adequately address judges' questions?	20	_____
Presentation	• Presentation Clarity & Style, Evidence of Teamwork, Poise answering questions.	10	_____

Any Comments to Team:

*AAEA = Agricultural and Applied Economics Association
** SWOT = Strengths, Weaknesses, Opportunities and Threats – a business environment analysis technique attributed to Albert Humphrey from Stanford University.

Table 3. FDRS* Food Marketing Challenge Judging Guidelines and Worksheet

Category	Description	Possible Points	Team Score
Case background	Provide a short overview of the situation, describing what are the factors leading to the food marketing challenge	5	____
What is the food marketing challenge in the case?	Identify the major issue(s) or problem(s) that the team plans to answer in their research proposal • Has a true problem been identified? • Is the problem clearly and concisely defined?	10	____
General industry knowledge	Present evidence that the research team has the general knowledge about the industry sector (e.g., market structure, market trends, consumer behavior/attitudes, competitors, etc.) to be credible analysts.	10	____
Proposed plan of research	Describe the research approach that the team proposes to use to answer the research question • What type of data will be collected? • How will the data be analyzed? • How much will it cost to collect and analyze the data?	15	____
Justify the proposal	Provide supporting evidence as to how the team's proposed research plan will address the marketing challenge • You've now told us what you plan to learn, how will that information help us make a decision?	15	____
Provide a budget	What will it cost to complete the project? How long will it take to complete the project?	5	____
Presentation	• Presentation clarity & style • Evidence of teamwork in the presentation • Quality of PowerPoint slides • Speak clearly and can be heard	25	____
Acted as consultants	Did they play the role of marketing research consultants bidding on a project addressing a management team	5	____
Q&A	• Poise in answering questions • Able to think on their feet	15	____
	- PENALTY POINTS FOR TIME		
	TOTAL POINTS		

Judges comments:

*FDRS = Food Distribution Research Society

looking for different things. Tables 2 and 3 contain examples of scoring criteria for the AAEA and FDRS case study competitions.

People to serve as judges: It can be difficult to find judges for the competition, especially if the competition happens before a conference starts or if the competition is not part of a conference. It is important to start the recruitment process early, especially when travel arrangements must be made. Judges can be chosen from a variety of areas. Often a good potential judge is a manager or owner associated with the case study firm, or people from that same industry who will have specific insight into the case study situation. Professors in academia with experience in agribusiness management and/or the writing of case studies are also good choices as judges, especially if they work with industry.

Costs: In any situation, and especially in the current economic times, it is important to keep costs in mind. When putting on a competition, there are many things (conference room rental, meals, equipment) that are needed, and if one has to pay for or rent them all, they will be paying a hefty sum out of their pocket. Instead of offering a budget, we want to highlight the various requirements for running a case competition and provide some ideas of how to minimize costs.

One of the largest possible expenses can be room rentals. If the competition is part of a convention, the organizer of the convention will likely take care of reserving the rooms. Depending on the accounting procedures and policies of that organization, these rooms could be charged to the competition. Oftentimes, that cost is simply rolled into the overall cost of the conference.

Along with rooms, comes the need for audiovisual equipment and supporting furniture. In each

room, there will need to be a computer, data projector, screen, and table to put the projector and computer on. These all add up, and in many cases, the AV system is expensive to rent from facilities like convention centers and hotels. Many conferences usually work with their members or host institution to provide this type of equipment, at least the computers and projectors. If the cost appears to be too prohibitive, perhaps one of the organizers can bring a computer and projector – a bit of an inconvenience, but may save significant cost.

Finally, the administrator of a competition has to consider refreshments. If the structure of the program is such that students simply show up for their presentations, perhaps there is no need for food or beverages. However, sometimes there may be a need to feed students (and judges). For example, early on, the Student Food Marketing Challenge provided lunch for students (originally a sit-down lunch and subsequently a boxed to-go lunch) during that Saturday of the program. This was eventually dropped due to time and budget constraints.

Summary

Case studies are a very functional educational tool in the classroom, but as we have outlined case study competitions can be utilized as a focal point for student competition on a regional or national level. In this role, they can get members of your organization involved, provide a service to students and introduce your group to them. In addition, case study competitions are a valuable way to involve industry and expose agribusiness managers to students. The resulting interaction is good for all concerned.

Literature Cited

Boland, M. and E. Gallo. 2009. International agribusiness strategy cases: A book in honor of Professor Ray Goldberg. K-State Printing Services, Kansas State University, Manhattan, KS.

Colorado State University. http://writing.colostate.edu/guides/research/casestudy/index.cfm Accessed on September 6, 2010.

Drucker, P.F. 2008. Management cases, Revised Edition (Paperback). Harper Paperbacks, New York.

Foster School of Business, University of Washington. http://www.foster.washington.edu/centers/gbc/globalbusinesscasecompetition/Pages/GBCC.aspx Accessed on September 6, 2010.

Graduate Student Section. Case study competition. Agricultural and Applied Economics Association. from http://www.aaea.org/sections/gss/Casestudy.html#2002CaseStudy. Accessed on September 6, 2010.

Gunderson, M., A.J. Johnson, M. Salassi, C. DeVuyst, and L. Champaign. 2009. Determining the future for Louisiana sugar cane products, Inc. Journal of Coops 22:1-21.

Harvard Business School Press. 2009. HBR case studies: Keeping strategy on track (Harvard Business Review Case Studies). Harvard Business School Press, Boston, MA.

IAMA, International Food and Agribusiness Management Association. 2010 Student case competition call for applications. http://www.ifama.org/library.asp?collection=2010_boston&volume=2010_student_case.pdf. Accessed on December 20, 2009.

McDade, S.A. 1995. Case study pedagogy to advance critical thinking. Teaching of Psychology 2(22):1

Schramm, W. 1971. Notes on case studies of instructional media. California Institute for Communication Research, Stanford, CA: Stanford University.

Seperich, G.J., M.J. Woolverton, J.G. Beierlein, and D.E. Hahn. 1996. Cases in agribusiness management. : Scottsdale, AZ: Gorsuch Scarisbrick Publishers

Student Food Marketing Challenge. http://fdrs.ag.utk.edu/casestudy.html. Food Distribution Research Society. Accessed December 20, 2009.

Wang, H. International Food and Agribusiness Marketing Strategy (AGEC 526) Syllabus. http://www.agecon.purdue.edu/academic/syllabi/agec52600.pdf. Purdue University. Accessed December 17, 2009.

World Association for Case Method Research and Application. http://www.wacra.org. Accessed September 6, 2010.

Yin, R.K. 2003. Case study research: Design and methods. 3rd ed. Applied Social Research Methods Series, Vol. 5., Thousand Oaks, CA: Sage Publications.

Quantifying the Critical Thinking Skills of Students Who Receive Instruction in Meat-Animal or Meat Product Evaluation

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Abstract

Meat-animal and meat product evaluation and participation on intercollegiate judging teams have long been reported to instill critical thinking and decision making skills in students, but no known work has quantified this objectively. Students within the Department of Animal Sciences at the University of Florida were given the EMI instrument to measure the Engagement, Cognitive Maturity, and Innovativeness of students at the start (Preintro; n = 110) and end (Postintro; n = 78) of the Introduction to Animal Sciences class, at the start (Preeval; n = 21) and end (Posteval; n = 21) of the meat-animal or meat product evaluation classes, and at the end (Postteam; n = 10) of participation on the intercollegiate meat or livestock evaluation team. Responses from Postteam students displayed greater ($P \leq 0.03$) Engagement than students the other test groups and greater ($P \leq 0.03$) Innovation than students from the Preintro, Postintro, and Preeval test groups. The results from this research objectively show participation on intercollegiate evaluation meat-animal or meat product teams improves students' critical thinking. The findings from this research further validate the efficacy of intercollegiate judging team participation to university administrators, program donors and sponsors, and prospective employers.

Introduction

The National Research Council (NRC) has stated that today's college graduates in the agricultural sciences are expected to have the ability to solve problems and critically evaluate complex situations (NRC, 2009). However, the NRC noted that many academic programs have not evolved to provide opportunities for students to develop these skills. They specifically suggested that students should be given opportunities to use a variety of data to make decisions and then be asked to defend their decisions. An existing activity that seems to meet all of these criteria is evaluating and assessing animals and animal products.

Animal science programs within land-grant universities and agricultural colleges have fielded animal or product evaluation teams for over a century, with a national contest for livestock and meat evaluation first held in 1900 and 1926, respectively (Davis et al., 1991; Mello et al., 1973). Most students involved in these activities take a background course at their home institution focused on proper terminology, understanding traits which influence the value of meat animals and the products they produce, and defending their decisions via written or oral communication (Heleski et al., 2003). Intercollegiate competitions serve as a method to gauge mastery of the skills acquired through coursework and add incentive for practicing evaluation and communication skills (Kauffman et al., 1984; McCann and McCann, 1992).

Employers in animal agriculture expect recent college graduates to have a strong knowledge base within their field of study and the ability for independent and critical thought (Berg, 2002; Field et al., 1998; Shann et al., 2006). Testimonies of former students, academicians, and meat-animal industry professionals document the value of participation on intercollegiate judging teams to instill critical thinking, communication skills and leadership in students (Field et al., 1998; Guthrie and Majeskie, 1996; Smith, 1989). Results from over 2,700 judging team alumni cited improved decision making skills as one of the primary skills gained from program participation (Davis et al., 1991; McCann and McCann, 1992). Other reports document judging team participants to have greater grade point averages (Berg, 2002) and post-graduation incomes (Morgan, 2003) than non-judging animal science alumni.

The only research known to objectively measure the critical thinking skills of students receiving instruction in livestock or meat evaluation reported students participating in a meat-animal evaluation course to have an increase in post-class Watson-Glaser objective critical thinking scores, compared to pre-class scores (Shann et al., 2006). The authors are not aware of any research which objectively quantifies the critical thinking of meat animal or meat product judging team participation.

Objective

The purpose of this study was to objectively assess the critical thinking skills of students within the Department of Animal Sciences at the University

[1]College Agricultural and Life Sciences.

of Florida (UF) at the start and conclusion of the Introduction to Animal Sciences class and the meat-animal or meat product evaluation classes and at the conclusion of competing on the intercollegiate meat or livestock evaluation teams.

Materials and Methods

Evaluations were made during the 2009-2010 academic year. Students were given the EMI instrument at the start (Preintro; n = 110) and end (Postintro; n = 78) of the Introduction to Animal Sciences class, at the start (Preeval; n = 21) and end (Posteval; n = 21) of the meat-animal or meat product evaluation classes, and at the end (Postteam; n = 10) of participation on the intercollegiate meat or livestock evaluation team. The critical thinking disposition test known as the EMI is similar to the Watson-Glaser test and measures the Engagement, Cognitive Maturity, and Innovativeness of students (Ricketts and Rudd, 2005). This test has been reported as having Cronbach's alpha coefficients of 0.89, 0.75, and 0.79 for Engagement, Cognitive Maturity, and Innovativeness constructs, respectively, suggesting the value of the test to assess differences in critical thinking (Norris and Ennis, 1989).

The 26 question EMI test contains 11 questions which measure Engagement, eight questions measuring Cognitive Maturity, and seven measuring Innovativeness. Each question was answered on a one to five summated rating scale, with one representing a low level of critical thinking and five representing extensive critical thinking, thus the possible per student totals for Engagement, Cognitive Maturity, and Innovativeness were, 11 to 55, 8 to 40, and 7 to 35, respectively. The Engagement questions measure a students' predisposition to use confident reasoning. The Innovativeness questions measure a students' predisposition to be intellectually curious and seek the truth. The Cognitive Maturity questions measure a students' awareness of real problems and openness to other points of view, while being aware of their own biases (Ricketts and Rudd, 2005).

The three formal meat-animal or meat product evaluation classes assessed along with the Introduction to Animal Sciences class were Live Animal and Carcass Evaluation, Meat Selection and Grading, and Live Animal Evaluation. Students within these classes were given the EMI instrument on the first and last day of instruction, whereas students participating on the intercollegiate meat or livestock evaluation teams were only given the EMI instrument at the conclusion of program participation.

Introduction to Animal Sciences is a four credit hour lecture and supplemental laboratory course which emphasizes the role of beef cattle, dairy cattle, swine, sheep, poultry, and horses in serving humans. The course introduces the anatomy and physiology of digestion, growth, and reproduction and the application of genetics to livestock improvement. The course also introduces animal health and management systems, livestock marketing, and animal products.

Live Animal and Carcass Evaluation is a hands-on two credit hour lecture/laboratory course which provides instruction on the evaluation, grading, and economic value of fed-beef, market hogs, and slaughter cows and the carcasses they produce. Laboratory activities include estimating carcass merit of live animals, and subsequent evaluation of their carcasses.

Meat Selection and Grading is a hands-on two credit hour lecture/laboratory course which provides instruction on grading, determining value, and ranking carcasses, wholesale cuts, and assessing the fabrication acceptability of subprimal cuts of beef, pork, and lamb. Laboratory activities include grading and ranking carcasses and cuts, defending their rankings via written reasons, and evaluating the acceptability of subprimal cuts.

Live Animal Evaluation is a hands-on two credit hour lecture/laboratory course which provides instruction on the science and art of live animal evaluation addressing all aspects of improving the selection of meat animals and the efficiency of meat animal production. Laboratory activities include evaluating and ranking market animals and breeding animals of all meat animal species using phenotype and performance records, and defending their rankings via oral reasons.

Members of the intercollegiate meat or livestock evaluation teams at UF receive extensive hands-on experience as they meet approximately 45 times during a 15-week semester to practice their evaluation and communication skills. Students take one of the three background courses prior to participation on one of the intercollegiate evaluation teams for consecutive spring and fall semesters. Students are given up to 15 minutes to evaluate the animals, carcasses or cuts, and to note differences, and then are given time to prepare oral or written reasons defending their placing. Students travel outside the state and practice at various operations including: livestock breeders, feeding operations and commercial slaughter facilities, as they travel to compete in up to three intercollegiate contests in the fall and spring semesters.

Question responses from the EMI were analyzed using ordinary least squares (PROC GLM, SAS Inst., Inc., Cary, NC) using test group (Preintro, Postintro, Preeval, Posteval, and Postteam) as the only fixed effects for the dependent variables of Engagement, Cognitive Maturity, and Innovativeness. The arithmetic mean and SD were reported for descriptive statistics and least squares means were separated statistically using pair-wise t-tests (P-DIFF option of SAS) when a significant ($P < 0.05$) F-test was detected. Additionally, the SE for each main effect mean was reported.

Results and Discussion

Demographics of students within Introduction to Animal Sciences (Intro) are indicative of the Animal Sciences majors at UF with the majority being pre-professional or science option (Prepro) and female (Table 1). This complements Buchanan (2008) who reported an increase in the percentage of both female students and students who intend to apply to a college of veterinary medicine, from departments of animal science across the country. Also, Intro is a required class for admittance into the College of Veterinary Medicine at UF, thus many non-animal sciences majors (NAS) in Intro are pre-professional students as a Biology, Microbiology and Cell Science, Food Science, or Wildlife Ecology and Conservation major. The average age of undergraduate students has increased over the past 20 years (Buchanan, 2008; Tsapogas, 2004). Approximately 40% of students are admitted into the College of Agricultural and Life Sciences at UF as juniors, rather than freshman.

Demographics of students within the three meat-animal or meat product evaluation classes (Eval) and those who participated on the intercollegiate meat or livestock evaluation team (Team) were collectively similar (Table 1), but those percentage demographics were different than Intro. A majority of Eval and Team students were female, but both groups had a greater percentage of male students than Intro. The majority of Eval and Team students were animal sciences majors with a food animal or equine option (FAE). The percentage of NAS students is similar between classes (Table 1), but a different group of NAS students comprise the percentage in Eval and Team than in Intro. Most Eval and Team students which are NAS are either Agricultural Education and Communication majors who aspire to gain greater evaluation experience prior to becoming a secondary agricultural teacher or are students with an agricultural background who are either Food and Resource Economics majors or not a student within the College of Agricultural and Life Sciences at UF.

The responses for the EMI constructs of Innovation and Engagement in this study (Table 2) are similar to the findings by Ricketts and Rudd (2005) for a comparable sample size of secondary and post-secondary agricultural education students. The values for Cognitive Maturity were almost 10 units greater for students from the current study at 31.4, than those reported by Ricketts and Rudd (2005) at 21.7. Students from the current study were almost three years older (20.7 vs. 17.8) than those sampled by Ricketts and Rudd (2005), likely affecting measurements of maturity.

Student responses for Cognitive Maturity were similar ($P = 0.21$) across test groups (Table 3). The findings for Cognitive Maturity by this and other reports (Ricketts and Rudd, 2005) suggest this EMI construct is more easily affected by chronological age than educational enrichment. The questions used to develop the Cognitive Maturity construct by Ricketts

Table 1. Descriptive Statistics for the Sample of Students within the Department of Animal Sciences at the University of Florida Measured by the EMI Test

			Gender, %		Undergraduate option[a], %		
Classes[b]	No. of Students	Avg. Age ± SD	Male	Female	FAE	Prepro	NAS
Intro	118	20.4 ± 1.5	29.66	70.34	8.47	53.39	38.14
Eval	26	20.9 ± 1.2	42.31	57.69	42.31	30.77	26.92
Team	10	22.9 ± 2.1	40.0	60.0	50.0	20.0	30.0
Total	154	20.7 ± 1.6	32.5	67.5	16.88	46.10	37.02

[a]FAE; Animal Sciences major with a food animal or equine option. Prepro; Animal Sciences major with a pre-professional/science option. NAS; Non-Animal Sciences major.
[b]Intro; Introduction to Animal Sciences class. Eval; Meat-animal or meat product evaluation classes. Team; Participation on the intercollegiate meat or livestock evaluation team.

Table 2. Descriptive Statistics for the Cognitive Maturity, Engagement, and Innovativeness of Students as Measured by the EMI test[a]

EMI Construct[b]	No. of Observations	Mean	SD	Minimum	Maximum
Cognitive Maturity	240	31.40	3.53	21	40
Engagement	240	44.60	5.05	27	55
Innovation	240	28.39	3.68	12	35

[a]Greater values indicate more extensive critical thinking.
[b]Cognitive Maturity: a students' awareness of real problems and openness to other points of view, while being aware of their own biases; range- 8 to 40. Engagement: a students' predisposition to use confident reasoning; range- 11 to 55. Innovativeness: a students' predisposition to be intellectually curious and seek the truth; range- 7 to 35.

Table 3. Comparison of Students' Critical Thinking at the University of Florida at the Start and End of the Introduction to Animal Sciences and the Meat-Animal or Meat Product Evaluation Classes and at the End of Participation on the Intercollegiate Meat or Livestock Evaluation Teams, as Measured by the EMI test[a]

	Least squares means ± SE for test group[b]					
EMI Construct[c]	Preintro (n = 110)	Postintro (n = 78)	Preeval (n = 21)	Posteval (n = 21)	Posteam (n = 10)	*P*-value
Cognitive Maturity	31.03 ± 0.34	32.10 ± 0.40	30.57 ± 0.77	31.83 ± 0.77	31.00± 1.12	0.21
Engagement	43.82[e] ± 0.48	45.23[e] ± 0.56	44.14[e] ± 1.09	44.64[e] ± 1.09	49.00[d] ± 1.57	0.02
Innovation	27.87[e] ± 0.35	28.65[e] ± 0.41	27.91[e] ± 0.79	28.98[de] ± 0.79	31.40[d] ± 1.15	0.04

[a]Greater values indicate more extensive critical thinking.
[b]Preintro: start of the Introduction to Animal Sciences class. Postintro: end of the Introduction to Animal Sciences class. Preeval: start of the meat-animal or meat product evaluation classes. Posteval: end of the meat-animal or meat product evaluation classes. Postteam: end of participation on the intercollegiate meat or livestock evaluation team.
[c]Cognitive Maturity: a students' awareness of real problems and openness to other points of view, while being aware of their own biases; range- 8 to 40. Engagement: a students' predisposition to use confident reasoning; range- 11 to 55. Innovativeness: a students' predisposition to be intellectually curious and seek the truth; range- 7 to 35.
[d,e]Values within a row lacking a common superscript letter differ (*P* ? 0.03)

and Rudd (2005) were reported to explain less of the critical thinking skill scores than Engagement and Innovativeness and was also reported to have a slightly inverse relationship with measurements of critical analysis and inference.

Responses from Postteam students displayed greater ($P \leq 0.03$) Engagement than students the other test groups and greater ($P \leq 0.03$) Innovation than students from the Preintro, Postintro, and Preeval test groups (Table 3). Student responses for Engagement and Innovation were similar ($P \geq 0.20$) across the four classroom test groups (Table 3). The material and curriculum of the Eval classes are similar to those for Team students, suggesting the extensive hands-on experiential learning opportunities improved the critical thinking of Team students.

Intercollegiate judging team participation has long been promoted to instill confident reasoning (Engagement) and intellectual curiosity (Innovation) in animal science students (Field et al., 1998; Guthrie and Majeskie, 1996; Helieski et al., 2003; Mello et al., 1973). Engagement is developed in judging team members in preparation for and during intercollegiate contests. Students are required to make independent decisions under pressure, and then defend those decisions via either oral or written communication to an industry expert. Engagement is also instilled by teammates interacting as competitors. Innovation is instilled in judging team members by being exposed to experiential learning in a real-world setting, much different than a classroom, where students are prompted to question, explore, synthesize, make and defend judgments (Schillo, 1997; Smith, 1989). These skills have been identified repeatedly by employers as those needed for success in many different careers (Berg, 2002; Coorts, 1987; Guthrie and Majeskie, 1997; Smith, 1989; Taylor, 1990).

Summary

Meat-animal and meat product evaluation and participation on intercollegiate judging teams have long been reported to instill critical thinking and decision making skills in students. The results from this research objectively show participation on intercollegiate evaluation meat-animal or meat product teams improves students' critical thinking. The findings from this research further validate the efficacy of intercollegiate judging team participation to university administrators, program donors and sponsors, and prospective employers. These activities develop skills that employers seek and align with the NRC's (2009) vision for undergraduate education in the agricultural sciences.

The data presented in this study represent one point in time in one academic program at one university. This research should be replicated at other universities to determine these same results would hold true with animal and animal product evaluation classes and activities. This research should also be replicated in the future to determine if the results of the current study are stable over time. Finally, this research should be replicated by examining similar activities and courses in other agricultural disciplines.

Literature Cited

Berg, P. 2002. Meat judging as a learning tool: Gender comparison. Jour. Anim. Sci. 80: 165. (Abstr.)

Buchanan, D.S. 2008. ASAS Centennial Paper: Animal science teaching: A century of excellence. Jour. Anim. Sci. 86: 3640-3646.

Coorts, G.D. 1987. Updating today's college curriculum for tomorrow's agriculture. NACTA Jour. 31-2: 20.

Davis, G.W., M.F. Miller, D.M. Allen, and K.L. Dunn. 1991. An assessment of intercollegiate meat judging from 1926 to 1989. NACTA Jour. 35(4): 28–31.

Field, T.G., R.D. Green, J.A. Gosey, and H.D. Ritchie. 1998. A summary of intercollegiate judging activity, funding and philosophy. NACTA Jour. 42(3): 27–31.

Guthrie, L.D. and J.L. Majeskie. 1997. Dairy cattle judging teaches critical life skills. Jour. Dairy Sci. 80: 1884-1887.

Heleski, C.R., A.J. Zanella, and E.A. Pajor. 2003. Animal welfare judging teams: A way to interface welfare science with traditional animal science curricula? Appl. Anim. Behavior Sci. 81: 279–289.

Kauffman, R.G., R.R. Shrode, T.M. Sutherland, and R.E. Taylor. 1984. Philosophies of teaching and approaches to teaching. Jour. Anim. Sci. 59: 542-546.

McCann, J.S. and M.A. McCann. 1992. Judging team members reflection on the value of livestock, horse, meats, and wool judging programs. Pro. Anim. Sci. 8: 7-13.

Mello, F.C., D.I. Davis, and D.D. Dildey. 1973. An analysis of intercollegiate meat and livestock evaluation contests. NACTA Jour. 17(1): 13-16.

Morgan, J.B. 2003. Intercollegiate meat judging: Past and future. In: Proc. 56th Annual Reciprocal Meat Conference, Columbia, Missouri.

National Research Council. 2009. Transforming agricultural education for a changing world. Washington, D.C.: National Academies Press.

Norris, S.P. and R.H. Ennis. 1989. Evaluating critical thinking. In: Swartz, R.J. and D.N. Perkins (eds.). Teaching and Thinking. Pacific Grove, CA: Midwest Publications.

Ricketts, J.C. and R.D. Rudd. 2005. Critical thinking skills of selected youth leaders: The efficacy of critical thinking dispositions, leadership, and academic performance. Jour. Ag. Ed. 46: 32-43.

Schillo, K.K. 1997. Teaching animal science: Education or indoctrination? Jour. Anim. Sci. 75(4): 950-953.

Shann, I.P., C.C. Carr, and E.P. Berg. 2006. Objective assessment of critical thinking ability of animal

science undergraduates through use of the Watson-Glaser Critical Thinking Appraisal. Jour. Anim. Sci. 84: 407. (Abstr.)

Smith, G.C. 1989. Developing critical thinking, communication skills, and leadership in animal science students. Jour. Anim. Sci. 67: 601. (Abstr.)

Taylor, M.E. 1990. Empowering freshmen to design their own learning experiences. NACTA Jour. 34(2): 46-49.

Tsapogas, J. 2004. The role of community colleges in the education of recent science and engineering graduates. National Science Foundation Bul. 04-315.

Characteristics and Employer Perspectives in Undergraduate Animal Industry Internships

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Abstract

Traditional employee screening processes are often based on academic performance. However, there can be a dichotomy between academic achievement and employee job performance. This study examined 11 years of records from 171 animal industry internships from students enrolled in an Associate Science degree programs. Internship employers evaluated employees on thirteen performance criteria using a Likert scale. Correlation analysis was performed between employer evaluation and intern salary; pre-internship cumulative grade point average (GPA), pre-internship practicum GPA and graduation. The GPA at the time of the internship was not different between students who graduated (2.88 + 0.49) compared with students who did not (2.47 + 0.58) so data was combined. The average intern earned minimal wage. Areas scored the lowest by employers were work speed (4.3 + 0.77) and technical knowledge (4.2 + 0.76) while cooperation with co-workers and acceptance by supervisors were identical (4.6 + 0.55). Work quality was positively correlated ($p < 0.05$, $r = 0.16$) with both GPA and salary. Technical knowledge was also positively correlated ($p < 0.01$, $r = 0.20$) with salary. Based on these data, academic indicators may not be the best predictor of employee performance, and students with a higher degree of technical skills may receive higher internship salaries.

Introduction

The Ohio State University Agricultural Technical Institute (Ohio State ATI) is an open enrollment institution where students pursue associate of applied science (AAS) degrees or associate of science (AS) degrees. The institute is organized within the College of Food, Agriculture, and Environmental Sciences at the Ohio State University, whose main campus is located 90 miles south of Ohio State ATI's rural Wooster campus. Each student must successfully complete carefully sequenced technical and general courses as prerequisites for upper level courses which are required for Associate degree completion. Students earning AAS degrees are expected to apply learning from their coursework to a required occupational internship. Students earning AS degrees must gain a strong academic foundation before they transfer directly into baccalaureate programs at the main campus. They do however have the option of completing an internship as part of their AS degree.

Ohio State ATI's teaching philosophy and institutional mission are based on a hands-on, experiential learning approach that provides students with both classroom theory and technical skills. Ohio State ATI opened its doors in 1972 and began requiring occupational internships in all majors in 1974. Required practicum courses (which are hands-on experiential, on-campus, learning models) were added in 1975. All AAS degrees require both experiential learning models (practicum and internship) to fulfill graduation requirements. Ohio State ATI incorporates semi-directed internships into their various curricula. Jackson and Jackson (2009) define semi-directed internships as those that meet the following criteria: 1) students receive academic credit, 2) college and/or university provides contacts for possible internships to students, 3) provides standardized forms to the employer for work performance assessment and 4) waives the university's liability for mistakes the student may make during their internship. Thus, students must obtain their own internship and act as an interface between the internship supervisor (faculty member) and the employer.

There have been numerous articles published during the last 10 years that document the benefits of career internships in college education. Tangible benefits for students that successfully complete college internships include: higher starting salaries (Gault et al., 2008; Coco, 2000); higher job satisfaction (Gault et al., 2008; Devine et al., 2007); more job opportunities after graduation (Coco, 2000; Devine et al., 2007); and improved job related skills (Devine et al., 2007; Knemeyer and Murphy, 2002). Additionally, student surveys indicated intrinsic benefits as well, including: development of communication skills (Knemeyer and Murphy, 2002); improvements in creative thinking; improved job interviewing and networking skills (Gault et al., 2008) and improved self-confidence and leadership skills (Lee, 2007). Benefits of college internships to other stakeholders, namely employers and universities, have been reported in the literature as well. Employers acknowledge that internship programs provide them with the best selection of future full-time and part-time employees (Coco, 2000; Devine et al., 2007); improve hiring decisions (Coco, 2000; NACE, 2005); and provide networking to colleges and

universities that promote an influx of new ideas (Thiel and Hartley, 1997). Universities believe that internship programs aid in college recruitment (Devine et al., 2007); improve their reputation (Thiel and Hartley, 1997); provide sources for external funding (Gault et al., 2008) and provide community networking and business input (Thiel and Hartley, 1997). Unfortunately, recently published articles regarding internship benefits often cite older research from the 1970s and 1980s, so current data on internships is limited. Furthermore, literature on agriculturally based internships is very limited. Therefore, the objectives of our study were to 1) characterize animal science internships 2) evaluate undergraduate job skills 3) determine if academic factors are successful in predicting superior job performance and 4) evaluate the relationship of salary to employer expectations.

Methods

This study examined records from 140 equine and 31 swine industry internships from students enrolled in Associate of Science programs from 1996 to 2006. Internships were either completed following one year of coursework and practicum experience or immediately prior to graduation and could be completed during any quarter. Internships were semi-directed and were comprised of a wide variety of internship types, locations and supervisory methodologies. Faculty internship instructors (Ohio State ATI tenure-track faculty) remained the same throughout the 11 year period. Internship information included: employer, employer contact information, dates of employment, position responsibilities, and daily hours of work, wages/salaries, and other compensation, was collected by the student and approved by the faculty instructor and employer. Intern compensation were categorized as voluntary, below minimum wage, minimum wage, above minimum wage and well above minimum wage (> 150% minimum wage) based on federal minimum wage guidelines in effect at the time of the internship. Additionally, remuneration was adjusted to include other forms of compensation such as room, meals, horse board, and show expenses.

Internship supervisors evaluated employees monthly using standard 'Internship Evaluation' forms, which remained consistent throughout the study. Supervisors scored student interns on 13 criteria, including: punctuality; willingness to learn; dependability; work quality; acceptance of constructive criticism; personal appearance; cooperation among co-workers; work speed; professionalism; supervisor acceptance; acceptance by customers; technical knowledge and overall performance using a Likert type scale ranging from 1-5. Descriptive terms were provided to the supervisor as follows: 5 (Superior), 4 (Good), 3 (Average), 2 (Fair) and 1 (Poor). Cumulative pre-internship grade point averages (GPA), pre-internship practicum GPA and post-internship graduation status were obtained from the ATI Office of Academic Affairs. Graduation was measured as completion of the Associate's degree program requirements with no specified time frame.

This study was deemed exempt by the Ohio State University Institutional Review Board.

Correlation analysis (Pearson) was performed between employer evaluation criteria and intern salary; pre-internship GPA, pre-internship practicum GPA and post-internship graduation status using least square means. Differences in internship location between equine and swine internships and between intern compensation (volunteer vs. paid) and employer evaluation of interns were analyzed using Chi-Square test. Significance was reported $p < 0.05$, and trends were reported with $p < 0.10$. All statistics were performed using SAS (SAS Institute, 2002).

Results and Discussion

The equine industry is a highly diverse industry with a plethora of careers representing it. Student interns found employment in many fields including: Standardbred and Thoroughbred racing; training, showing, boarding; recreation and tourism; equine support industries (health, tack, supplies) and breeding and production. Swine internships were not as diverse with the majority of students (76%) finding employment in the production field. Alternative swine internships included the areas of nutrition, showing, pork processing facilities, and swine facility construction (Table 1). Interns in both the equine and

Table 1. Internship Types: Percentage over 11 Year Period

	Equine Internships (%) (n = 140)	Swine Internships (%) (n = 31)	Combined (%) (n = 171)
Training/Showing/Boarding	38.7	5.9	32.2
Production	14.7	76.5	26.8
Recreation	30.6	0	24.6
Racing	10.2	0	8.2
Industry Support	5.8	11.8	7.0
Research	0	5.8	1.2

Figure 1. Distribution of undergraduate animal science internships. Numbers indicate internships completed per state.

swine industries were most likely to seek and find employment within state (Ohio, 73%) compared to out-of-state (Figure 1). Many students appeared reluctant to move out of state even for the short duration of the internship. It is likely that age, maturity, friends, and family connections, and difficulty securing temporary housing for short-term employment are all contributing factors to their reluctance to seek out of state internships. Numerous equine internships were located in Colorado and Texas given the abundance of summer recreational equine opportunities in those areas. By comparison, few swine students migrated to leading pork producing states such as Iowa and North Carolina.

The mean salary of undergraduate student interns in this study was minimum wage. However, the median salary of undergraduate agricultural interns was above minimum wage. Salary distributions were as follows: volunteer (no compensation), 8.7%; below minimum wage, 16.3%; minimum wage, 30.8%; above minimum wage, 42.4%; and greater than 150% of minimum wage, 1.7% (Figure 2). Swine internship salaries on average were above those of equine internships. This is likely due to the vocational nature of swine production versus equine production which is more of an avocation. However, salary-based gender bias was difficult to determine due to the predominance of male and female self-selected swine and equine careers respectively. Volunteer internships were almost exclusively equine (Figure 2).

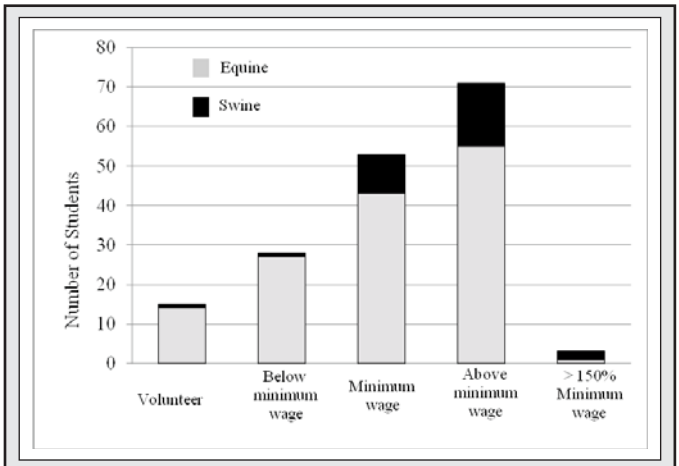

Figure 2. Internship salary distribution in undergraduate animal science programs.

Internship salaries in this study were considerably lower than intern salaries reported by others. Nagle and Collins (1999) reported average hourly internship salaries of $10.52 with summer employees earning $9.07/hr., this equates to 50% above minimum wage. Undergraduate interns in the engineering ($12.25/hr to $13.93/hr) and business fields ($10.88/hr to $11.58/hr) were also better paid. We hypothesize that the difference between the average salary in our study and other reported internship salaries most likely reflect differences in starting salaries in agricultural disciplines when compared to other careers. The degree being sought (Associate of Science vs. Bachelor of Science) may also be a factor in the salary discrepancy since M.B.A. interns earned more than $20/hr. (Nagle and Collins, 1999).

Overall, interns received high evaluation ratings from their internship supervisors averaging 4.0 to 4.6 across the 13 criteria. Comparison of evaluation data from students that graduated with an AAS degree vs. non-graduates was not different (Table 2), so data were pooled for subsequent analysis. Employers consistently rated student interns very highly in the areas of: cooperation among co-workers; supervisor acceptance; willingness to learn; and acceptance by customers. Similarly, employer written comments were consistent with the Likert scores and included comments such as "compatible with fellow workers as well as customers…not afraid of work…dependable;" and "learns very quickly…dependable and willing to do whatever it takes to get the job done." Interns received the lowest employer ratings in technical knowledge and work speed. Employers indicated that students "could use a little more confidence when working with horses… technical knowledge is ok for working as my assistant but would definitely need more before starting own business;" "only area of improvement is to become technically stronger which comes with experience;" and "needs to kick up the work pace."

Table 2. Comparison of Intern Evaluation Ratings Based On Post-internship Graduation Status

Evaluation Criteria	Graduated	Did Not Graduate
Punctuality	4.6 ± 0.64	4.4 ± 0.83
Willingness to Learn	4.5 ± 0.58	4.5 ± 0.68
Dependability	4.5 ± 0.73	4.4 ± 0.78
Work Quality	4.5 ± 0.62	4.3 ± 0.83
Acceptance of Constructive Criticism	4.4 ± 0.69	4.3 ± 0.73
Personal Appearance	4.6 ± 0.52	4.4 ± 0.54
Cooperation among co-workers	4.6 ± 0.56	4.6 ± 0.44
Work Speed	4.3 ± 0.75	4.2 ± 0.73
Professionalism	4.4 ± 0.72	4.3 ± 0.81
Supervisor Acceptance	4.6 ± 0.53	4.5 ± 0.56
Acceptance by customers	4.5 ± 0.53	4.5 ± 0.52
Technical Knowledge	4.3 ± 0.68	4.0 ± 0.88
Overall	4.5 ± 0.63	4.3 ± 0.73

Evaluation ratings are expressed as the mean ± standard error of the mean based on a Likert scale from 1-5 (5 is high). No statistical differences in intern evaluation ratings between those students that graduated compared to those that did not graduate. However, evaluation scores for non-graduates never exceeded those received by graduates.

The high evaluation ratings observed in this study could be indicative of several important factors that include: supervisor satisfaction with intern performance, adequate match of intern and job placement, congruency between supervisor and employee expectations or leniency or unfamiliarity with employee performance evaluation techniques. A recent study conducted by McDonough and associates (2009) reported similar results. They incorporated a 34 statement questionnaire in which they

compared intern and supervisor responses to competencies categorized into four groups: general abilities in the workplace, specific skills, interpersonal skills and professional conduct. Similar to our study, they incorporated a 5-point Likert scale to describe job competencies. Evaluations occurred at the midway point and at the end of the internship and evaluated criteria were similar. McDonough et al. (2009) reported both supervisor and student intern ratings between 4.2 and 4.8 on the 5-point Likert scale, with students consistently rating their performance higher than their supervisors' rating. In our study, we only looked at supervisors' evaluations, but they were always high. These phenomena may suggest employers are supportive of internship programs for a variety of reasons. Interns represent a relatively inexpensive form of labor, they are available seasonally and employers may want to encourage young career-minded professionals to enter the job market.

Alternatively, students at Ohio State ATI complete practicum courses prior to their internships. Practicum consists of skill development activities relative to the students' field of study as well as basic industry related tasks. ATI faculty supervise students closely throughout practicum courses and have working knowledge of individual student strengths and weaknesses. Thus, students should be at least minimally prepared for internship and matches between students and employers may be more suitable because of faculty familiarity with job tasks and the observed skill sets of students.

Students may have received lower employer-evaluation scores in work speed because educational resources at Ohio State ATI, such as animal numbers, typically do not mirror industry scope or scale. Thus, students are limited in the ability to develop efficient work skills. Alternatively, some students seem to lack intrinsic motivation to practice until skill mastery is achieved. The lowest rated criterion by employers was technical knowledge. Many students fulfill their internship requirements between their first and second year of college. Thus, students are completing their internship without the benefit of any coursework in some technical areas. Another contributing factor may be the myriad of techniques, industry practices, and resources (e.g. computer software) used by employers to which students may not have been previously exposed.

Although overall internship evaluation ratings were high, it was uncommon for students' to receive 'perfect' evaluations, consisting of all thirteen criteria being evaluated as a '5' or 'superior'. Chi-square analysis revealed that students performing volunteer internships (n= 15) were more likely ($P > 0.05$) to receive perfect evaluations (40%) compared to students who were compensated (n =156, 17.5%). It is possible that employee supervisors were more lenient on employee evaluations because labor was free. This may imply that students enrolled in a volunteer internship possess an advantage in course grading if supervisor evaluations are part of the course assessment process.

One of the objectives of this research was to determine if measures of academic achievement (cumulative GPA and/or practicum GPA) could be used as a predictor of internship success. In the present study, no correlations were found between the cumulative total of supervisors' evaluation of intern performance and any objective academic assessment tools (cumulative GPA and practicum GPA). However, correlations were detected between academic achievement and several specific internship evaluation criteria. Cumulative GPA was weakly but positively correlated ($P < 0.05$) with both 'punctuality' ($r^2 = 0.16$) and 'quality of work' ($r^2 = 0.15$). A student's practicum GPA had no effect on any criteria evaluated by supervisors during the undergraduate internship. It is possible that many characteristics that describe the ideal employee are not related to academic performance indicators. The AAS programs at Ohio State ATI typically attract students that have a career and technical educational (CTE) background and often excel in activities that incorporate active and applied pedagogical methods. This style of learning aligns well with Gregorc's (1982) description of concrete, sequential learners. Orr and associates (1999) reported that students enrolled in vocational technical institutes with one dominant learning style were more likely to be concrete sequential learners. Others suggest that course grades, and consequently, cumulative GPA, may be influenced by the learning styles of faculty compared to students, either matched or mismatched (Thompson et al., 2002). Elliott (2007) reported that students characterized as high kinesthetic learners were associated with lower high-stakes test scores and were predominately found in CTE students. Thus, students' cumulative GPA may not be a good indicator of job performance success.

Technical knowledge was positively correlated ($P < 0.01$) with internship salary, ($P < 0.10$) as was 'willingness to learn' and 'quality of work'. This suggests that students possessing a higher level of technical skill and/or competency or those that are perceived by employers to be highly motivated to learn may be better compensated during their undergraduate college internships.

Summary

The internship experience is an important one for students. It provides additional opportunities for learning, gaining of experience, and provides additional exposure to alternative industry practices, techniques, and resources. Many students would likely gain more valuable life experiences if they would seek internships solely on their merit and educational opportunities rather than on ancillary factors such as distance from home. Student internship success cannot be predicted by academic performance indicators such as GPA. Internship salaries

may be influenced by students' prior experience and technical expertise or the employer's perception thereof. This study also shows the labor cost to the employer may influence internship evaluations, particularly for volunteer internships.

Literature Cited

Coco, M. 2000. Internships: A try before you buy arrangement. S.A.M. Advanced Management Journal 65: 41-45.

Divine, R., J. Linrud, R. Miller, J.H. Wilson. 2007. Required internship programs in marketing: Benefits, challenges and determinants of Fit. Marketing Ed. Rev. 17(2): 45-52.

Elliott, J. 2007. Who is smarter, CTE or other students? A five-year high-stakes test score comparison answers the question. Techniques (ACTE) 82(6): 50-52.

Gault, J., J. Redington, and T. Schlager. 2008. Undergraduate business internships and career success: Are they related? J. Marketing Ed. 22(1): 45-53.

Gregorc, A.F. 1982. An adult's guide to style. Columbia, CT: Gregorc Associates.

Jackson, R. and M. Jackson. 2009. Students assessment of a semi-directed internship program. Jour. of Geography 108: 57-67.

Knemeyer, A.M. and P.R. Murphy. 2002. Logistics internships: Employer and student perspectives. International Jour. Physical Distribution and Logistics Management 32(2): 135-152.

Lee, S. 2007. Increasing student learning: A comparison of students' perceptions of learning in the classroom environment and their industry-based experiential learning assignments. Jour. Teaching in Travel and Tourism 7(4): 37-53.

McDonough, K., L. Rodriquex, M. Prior-Miller. 2009. A comparison of student interns and supervisors regarding internship performance ratings. Journalism and Mass Communication Educator 64(2): 140-155.

Nagle, R. and M. Collins. 1999. Workplace education: A survey of employers on experiential education programs. Jour. Career Planning and Employment 60(1): 39-42.

National Association of Colleges and Employers. 2005. 2005 NACE experiential education survey executive summary, Bethlehem, PA.

Orr, B., O. Park, and D. Thompson. 1999. Learning styles of postsecondary students in enrolled in vocational technical institutes. Jour. of Industrial Teacher Education 36(4): 5-20.

SAS Institute. 1999-2002. Statistical Analysis Software Version 8.02. http://www.sas.com/.Cary, NC. Accessed May 18, 2003.

Thiel, G. and N. Hartley. 1997. Cooperative education: A natural synergy between business and academia. SAM Advanced Management Jour. 62(3): 19-24.

Thompson, D.E., B. Orr, C. Thompson, and O. Park. 2002. Preferred learning styles of postsecondary technical institute instructors. Journal of Industrial Teacher Education 39(4): 63-78.

Texas A&M University Student Life Skill Development and Professional Achievement from Participation on a Collegiate Judging Team

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Abstract

Animal evaluation programs are valued forms of extracurricular learning tools for many youth and collegiate students, as many of these programs have been attributed to improved skills and abilities such as confidence, self-esteem, and critical thinking. A survey was designed to assess how participation on a collegiate judging team affected life skills in the area of personal and career development. Survey results found that judging team involvement and experiences helped develop multiple skills in participants such as: learning the value of hard work and dedication to a common goal, learning to be self-assertive, learning to control anxiety, and respecting others' opinions. Additional skills achieved through judging team participation were: improved verbal communication, patience, confidence as a leader, and confidence in social settings, among other skills. These results give further validation to animal judging and evaluation teams and how they can have a profound effect on participants in personal and professional development.

Introduction

Judging evaluation programs are well established in many universities as a means to implement greater education in evaluation of numerous types of livestock, meats, and wool. Many of these programs are extracurricular to the education the student receives from core curriculum courses and helps to reinforce what is being learned through classroom teaching. Through many hours of practice students put into these teams, valuable industry knowledge and practical approaches to selection and production are gained. Some might argue that more importantly, other skills are perceived to be developed as well; such as confidence, oral communication, and team work skills (McCann and McCann, 1992; Nash and Sant, 2005; Rusk et al., 2002). Previous work has identified the success that judging programs have on the development of these life skills; however, much of the work has been done on perceived development on 4-H aged youth (Boyd et al., 1992; Nash and Sant, 2005; Rusk et al., 2002) or a wide variety of college students throughout the country (McCann and McCann, 1992). The current research seeks to identify life skill development in the judging programs of Texas A&M University and the impact that involvement in had on the individual's career development after completing college.

Therefore, the objectives of this study are to:

1. Measure the effectiveness of judging programs on life skill development
2. Evaluate perceived abilities in communication
3. Lend credibility to judging programs as a means of additional, long term education in the college setting

Methods

Individuals were contacted via email from a mass email list of all Animal Science graduates of Texas A&M University from the Former Student Center or from the Animal Science Department directly. The Texas A&M Institutional Review Board approved the study protocol and all participants provided documented informed consent prior to participation in the study.

In order to meet criteria established for this project, respondents had to have been previous members of an evaluation program consisting of horse, livestock, meats, wool, dairy, or meat animal (Ak-Sar-Ben) and currently in an established career (i.e. graduate programs would not meet eligibility). Validity of the survey was established by a group of industry professionals to insure proper interpretation of each question, as well as to secure the appropriate questioning for this research idea. In this way, face validity was established.

The survey included 25 questions related to the perceived development of life skills through a collegiate judging program and the potential effect it may have had on professional development. The survey was designed to address questions that would provide feedback to the values established in the respondents' career in relation to time invested in a collegiate judging program. Additionally, a specific set of questions were used to evaluate interpersonal skills gained through participation in a judging

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program (i.e. assertiveness with others, patience, confidence in social situations, etc.). Routinely used response criteria allowed participants to answer: "strongly agree," "agree," "disagree," "strongly disagree."

Additionally, some questions asked participants to numerically rank their perception of life skill development that was gained from a judging program. A scale of one to 10, with one being low and 10 being high, was used. The final question asked the respondent to "list the life skill(s) you learned from a judging team that has been the most useful in life and your career." This was an open ended question that was analyzed through content analysis which provided for grouping of similar characteristic answers.

This study uses descriptive statistical methods to measure learning outcomes. The results include percentages and means in order to summarize and interpret the data. The survey was examined by industry professionals versed in judging and selection in order to establish content validity. Additionally, reliability of the survey question categories was measured using Cronbach's alpha.

Results and Discussion

A total of 317 completed surveys (identified as 198 male and 119 female; from years judged of 1958 - 2007) were received from former students of Texas A&M University and its judging programs out of approximately 1,100 disseminated surveys (response rate = 29%). Questions concerning judging team involvement or career values and development in interpersonal skills achieved high reliability (Cronbach's alpha of 0.86 and 0.91, respectively). Texas A&M has six active programs and acquired completed surveys from previous team members in all programs (livestock 24.9%; horse 24.5%; meats 22.3%; wool 14.0%; meat animal (Ak-Sar-Ben) 10.8%; dairy 3.5%). The survey asked each participant to briefly describe their current career profession. The most often listed were: Professor – 4.10%, Rancher – 4.10%, Extension agent – 5.36%, Teacher – 5.68%, Sales – 7.89%, Management – 11.36%, and Entrepreneur – 12.93%.

The respondents were first asked if judging provided them with skills essential for their career development or current position. Responses favored "Strongly Agree" and "Agree" (68.7% and 28.5%, respectively; mean = 1.34 ± 0.53) while 2.9% stated "Disagree" and 0.0% "Strongly Disagree." Following this initial question, the survey continued to ask questions concerning how judging team involvement affected their career with the same choices available (Strongly Agree to Strongly Disagree). Answers to questions concerning judging team involvement on the respondent's career indicated they "strongly agreed" (1) to "agreed" (2) that judging team experiences had an effect on multiple skills such as: learning the value of hard work and dedication to a common goal (1.31 ± 0.51), learning to be self-assertive (1.41 ± 0.53), learning to control anxiety (1.48 ± 0.57), and respecting others opinions (1.44 ± 0.55) amongst other results (Table 1).

Additionally, previous judging team members were asked to indicate (on a scale of 1-10; 1 = did not affect, 10 = highly affected) how much they feel that participation on a judging team affected their interpersonal skills (Table 2). Results conclude that verbal communication with others resulted in the highest score (8.74 ± 1.40) while patience was deemed the least (7.24 ± 1.83). As Table 2 indicates,

Table 1. Mean (±SD) and Frequency of Survey Responses from Questions Concerning if Time spent on a Judging Team Affected the Respondents' Career

		Frequency of Response (%)			
	Mean±SD	Strongly Agree: 1	Agree: 2	Disagree: 3	Strongly Disagree: 4
Learned the value of hard work and dedication to a common goal	1.31±0.51	226 (71.3)	85 (26.8)	5 (1.6)	1 (0.3)
Learned to maintain my personal opinion while being open minded to the suggestions of others	1.37±0.50	202 (63.7)	113 (35.7)	2 (0.6)	0 (0)
Learned to be self assertive	1.41±0.53	194 (61.2)	117 (36.9)	6 (1.9)	0 (0)
Developed ability to respect others opinions	1.44±0.55	187 (59.0)	123 (38.8)	6 (1.9)	1 (0.3)
Developed a professional public speaking ability	1.47±0.81	204 (64.4)	94 (29.6)	19 (6.0)	0 (0)
Learned to control anxiety in stressful situations while maintaining composure and focus	1.48±0.57	175 (55.4)	130 (41.1)	11 (3.5)	0 (0)
Self esteem was enhanced	1.48±0.59	179 (56.5)	123 (38.8)	15 (4.7)	0 (0)
Learned to interrelate with diverse personality group	1.49±0.59	178 (56.2)	125 (39.4)	13 (4.1)	1 (0.3)
Developed strong time management skills	1.62±1.26	162 (51.3)	131 (41.4)	23 (7.3	0 (0)

Table 2. Mean (±SD) Response (1=low, 10=high) for Participation on a Judging Team in Relation to the Development of Interpersonal Skills

	Mean±SD
Patience	7.24±1.83
Assertiveness with others	7.60±1.79
Ability to work well with others	8.17±1.52
Task and goal priority	8.30±1.52
Confidence in social situations	8.34±1.57
Confidence as a leader	8.59±1.55
Confidence with authority figures	8.61±1.46
Verbal communication with others	8.74±1.40

all mean scores were relatively high on the 1-10 scale.

The last question on the survey asked the participants to specifically list the life skills developed from a judging team that has been the most useful in their life and career. The following are the most popular summarized answers as a percentage of the total responses to this question (n = 265): Teamwork – 8.20%, Communication – 11.67%, Confidence – 11.99%, Public Speaking – 13.56%, and Decision Making – 13.56%.

Current academic curricula aim at preparing the student to be more competent in specific course subject matter. However, the benefits that encompass participation in extracurricular activities, specifically animal evaluation teams, have documented success in life-skill development and work force preparedness (Nash and Sant, 2005). Many judging team participants may initially become involved in such activities with the idea in mind of peaking interest in specific industries (McCann and McCann, 1992); however, arguably more importantly, the current research implies that many skills are gained that directly impact the individual in a more profound way. Beyond achieving better evaluation skills, the participants gain confidence, learn time management skills, develop patience, and establish better oral communication. The attributes established in the current research are in agreement with prior publications that found increased communication skills, teamwork, and organization skills through participation on judging teams (Guthrie and Majeskie, 1997; McCann and McCann, 1992; Nash and Sant, 2005). These skills have been credited by many employers as those competencies necessary for success in many different careers (Berg, 2002; Smith, 1989; Guthrie and Majeskie, 1997). Decision making ability and industry knowledge are also valued by employers of people within the agriculture field (Berg, 2002).

The current data reinforce the successful establishment of communication skills, along with confidence in social settings and confidence as a leader among many other valuable skills. Interestingly, of the surveys received, a high percentage of these people developed careers that required a strong ability in interpersonal and relational skills (i.e. professors and teachers, managers, and entrepreneurs).

These results give validity to judging programs, specifically at Texas A&M University, but also throughout the country, especially those at the collegiate level. Data presented here provide a means to advertise judging programs to college students who may not have had previous opportunities to participate and, therefore, do not know the relevance of such programs. Additionally, budgetary restraints, lack of understanding and/or lack of previous involvement may lead some to believe that extracurricular activities, specifically evaluation teams, are not valuable to students. Reporting the results from the current research provide clear and credible data that judging team involvement creates an invaluable resource for students to gain critical thinking abilities and develop life-skills that will make them more valuable to employers, and more importantly assist them in being better prepared to deal with all forms of relationships. Also, these programs provide an avenue to supplement theory courses with hands-on experience that prove to be beneficial to careers and lives in general.

Summary

The results from this study are in agreement with previous reports that emphasize the importance of judging programs within the university setting. Additionally, results illustrate the need for continued support of judging programs as many employers have expressed that preference may be given to potential candidates who have participated on judging teams because of the advantage they may have in areas of communication, critical thinking, and information management. These attributes are valuable components of a college education and provide participants with an advantage in job placement and lend to more success in their chosen profession. Finally, results from this study give further validity to continuance of judging and evaluation programs as an intricate component of a well-rounded education.

Literature Cited

Berg, P. 2002. Meat judging as a learning tool: Gender comparison. Jour. Animal Science 80(1): 165. (Abstr.)

Boyd, B.L., D.R. Herring, and G.E. Briers. 1992. Developing life skills in youth. http://www.joe.org/joe/1992winter/a4.php. Jour. of Extension [on-line] 30(4).

Guthrie, L.D. and J.L. Majeskie. 1997. Dairy cattle judging teaches critical life skills. Jour. Dairy Science 80(8):1884-1887.

McCann, J.S. and M.A. McCann. 1992. Judging team members reflection on the value of livestock, horse, meats, and wool judging programs. Professional Animal Scientist 8:7-13.

Nash, S.A. and L.L. Sant. 2005. Life-skill development found in 4-H animal judging. http://www.joe.org/joe/2005april/rb5.php. Jour. of Extension [on-line] 43(2).

Rusk, C.P., C.A. Martin, B.A. Talbert, and M.A. Balshweid. 2002. Attributes of Indiana's 4-H livestock judging program. http://www.joe.org/joe/2002april/rb5.html. Jour. of Extension [on-line] 40(2).

Smith, G.C. 1989. Developing critical thinking, communication skills, and leadership in animal science students. Jour. Animal Science 67: 601.

Knowledge and Utilization of Authentic Assessment Techniques by Lecturers in Botswana College of Agriculture

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Abstract

This paper examined knowledge and use of authentic assessment techniques (a performance based assessment requiring learners to utilize their knowledge in a meaningful context) among lecturers in Botswana College of Agriculture. A simple random sampling technique was used to select 40 lecturers from 96. The results show that in terms of use, 47.5% of lecturers use authentic assessment while 52.3% do not. Lecturers were more knowledgeable on items such as authentic assessment requires students to apply skills and abilities as they would in real life (100%); and authentic assessment involves direct examination of student's ability to use knowledge to perform a task that is encountered in real life (100%). The most prominent constraint to the use of authentic assessment is that it is time consuming (90%). Significant determinants were teaching experience (t = 3.61), educational level (t = 4.36), holding administrative positions (t = -4.71) and knowledge of authentic assessments (t = -3.90). It is important therefore that the use of authentic assessment is popularized among lecturers.

Introduction

The interchangeable use of tests and assessments can lead to confusion because the two may be involved in a single process. According to Linn and Miller (2005), assessment is a general term that includes a full range of procedures used to gain information about students learning and the formation of judgments concerning student learning. French (2003) defines assessment as the gathering, interpretation, and use of information to aid teachers' decisions making. Assessment also has a diagnostic purpose, for teachers to identify areas of weakness with a view to remediate action. According to Chan and Gurnam (2010), assessment provides feedback that facilitates learning provided it is integrated into instructional purposes. Assessment can be used to provide a student with qualification which signifies that they have reached a certain level of competence or knowledge. Palm (2008) noted that assessment is used for selection to different institutions within the education system.

According to Race (2001), placement assessment is the determination of learners' performance at the beginning of instruction to obtain an idea of the abilities and interest of learners while diagnostic assessment is concerned with the persistent learning difficulties that are left unresolved by the standard corrective prescriptions (Linn and Miller, 2005). Formative assessment is used to monitor learning progress during instructions in order to provide feedback to both students and teachers concerning learning successes and failures. Summative assessment determines achievement at the end of instructions in order to document learner performance after instructions have been completed (Race et al., 2005).

Alternative assessment is usually designed by teachers to gauge students understanding of material. This can be open-ended questions, written compositions, oral presentations, projects, experiments, and portfolios of students work. Alternative assessments are designed so that contents of assessment match that of instruction. According to Leach et al. (2001a), authentic assessments are criterion-referenced measures designed to promote the integration of factual knowledge; high-order understanding and relevant skills. Authentic assessments are often based on performance, requiring students to utilize their knowledge in a meaningful context. In authentic assessment, performance expectations guide learning activities and are made clear to students prior to instructions (Leach et al., 2001b).

According to Airasian (2005) teachers use two primary methods to gather information about learners, namely paper and pencil technique and observation. Taras (2002) noted that when students carry out an activity, it is best to use the observation procedure rather than paper and pencil technique. This was based on the assertion that learning outcomes in skill areas and behavioral changes in personal –social development are especially difficult with paper and pencil tests.

In the past, assessment in schools was mainly done through paper and pencil exercise. However, assessment has gone well beyond paper and pencil exercise to observations of performances or development of portfolios (Woolf, 2004). Also, the demand for greater accountability in education by donors, government and public, has led to a move away from traditional standardized tests (Hall, 2004). Authentic assessment requires learners to perform a task

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rather than selecting an answer from a readymade list. Authentic assessments are adaptable, flexible, ongoing, and cumulative, depicting learners' growth over time. However to implement authentic assessment techniques requires abandoning traditional notions about testing and evaluation of performance on tasks, because performance on one task provides little information on other tasks.

Agriculture is a practical subject and its assessment should reflect this context. The acquisition of skills and competence in agriculture would therefore be improved through the use of authentic assessment technique. Anecdotal evidences suggest that the assessment of learners in agricultural courses in most cases have been limited to pen and paper, thus limiting the students to recall alone. For the application of authentic assessment technique to bring about the desired impact on agriculture, it is important that teachers are knowledgeable and adopt this assessment technique. The objective of this study was to determine knowledge and utilization of authentic assessment technique by lecturers in Botswana College of Agriculture Lecturers. Specifically, demographic characteristics were identified, knowledge and use of authentic assessment technique ascertained and constraints to use of authentic assessment technique determined.

Materials and Methods

A descriptive survey method using a questionnaire technique was employed in the study carried out at Botswana College of Agriculture. This college is the only citadel of learning in the country that has the mandate on training and development of manpower in agriculture. It is organized into Departments of agricultural economics, education and extension, animal production, agricultural engineering and land use, crop production, food technology and basic sciences. The population of the study was 96 lecturers at Botswana College of Agriculture. A simple random sampling technique was used to select 40 out of 96 and data were collected through a structured questionnaire that was designed based on literature review and study objectives. The questionnaire consisted of open-ended questions on demographic and a knowledge test scale consisting of 23 items (True or False). The use of authentic assessment technique was measured by asking respondents to state Yes or No, the reasons and frequency of use. The definition of authentic assessment was stated on the questionnaire in order to have a convergence of meaning between the researcher and the respondents on the concept. Questions on constraints on the use of authentic assessment technique were open-ended to which lecturers provided their responses. Validity was ensured through expert panel among measurement and evaluation specialists in University of Botswana and a split-half technique generated a reliability coefficient value of 0.90 for the questionnaire. Data collected were analyzed using Statistical Package for Social Sciences (SPSS), with frequency counts,

Table 1. Personal Characteristics of Respondents

PERSONAL CHARACTERISTICS	FREQUENCY	PERCENTAGE
Gender	30	75
Male	10	25
Female		
Age		
Less than 30 years	1	2.5
30 – 40 years	8	22.5
41 – 50 years	19	42.5
Above 50 years	8	20
Teaching experience		
Less than 10years	3	7.5
10 – 20 years	22	45
21-30 years	11	37.5
Above 30 years	4	10
Educational level		
MSc	10	25
PhD	30	75
Job designation		
Lecturer	19	37.5
Senior Lecturer	14	35
Associate Professor	1	2.5
Professor	5	12.5
Department		
Basic Science	10	25
Agricultural Economics, Education and Extension	10	25
Agricultural Engineering and Land use	8	20
Crop Production	6	15
Animal Production	6	15
Marital status		
Single	5	12.5
Married	32	80.5
Divorced	3	7.5
Household Size		
Less than 3 persons	8	20
3-4 persons	28	75
Above 4 persons	4	10
Number of committees membership		
1-5	36	92.5
Above 5	4	7.5
Administrative position holders		
Yes	4	10
No	36	90

percentages, means, standard deviation, and multiple regression analysis.

Results and Discussion

The personal characteristics of lecturers show that that 75% of respondents were male and 25% were female (Table 1). This reveals that there were more male lecturers at Botswana College of Agriculture. This may be attributed to the age-long perception that agriculture is a male dominated career. In terms of age, Table 1 shows that 62% of the lectures were above 40 years with 93% having at least 10 years of teaching experience at tertiary level (Table 1). Most of the lecturers (75%) were PhD holders, a trend that is expected in tertiary level of education. Also, 72% of the respondents were Senior lecturers and above according to university academic staff designations. This shows that the respondents are experienced teachers in their respective discipline. The distribution of respondents across academic departments shows that 25% were from basic science; 25% from agricultural economics, education and extension; 20% from agricultural engineering and land use; and crop production and animal production had 15% each. The household size of respondents was examined based on the expectations that the degree of interference with job may be correlated with household size. In this study, 75% of lecturers have household size of three to four and 92.5% belong to a number of committees ranging from one to five. Most of the lecturers (90%) do not hold any administrative positions. Only 10% of the respondents hold administrative position such as head of department, coordinator of graduate studies, and farm practical training coordination.

From a list of 23 items on knowledge of authentic assessment technique, lecturers were more knowledgeable on items such as authentic assessment requires students to apply skills and abilities as they would in real life (100%); authentic assessment involves the direct examination of student's ability to use knowledge to perform a task that is encountered in real life (100%); there are more opportunities to observe the process students use to arrive at their answer or response in authentic assessment (95%); students who do not perform well in paper and pencil technique have an opportunity to show their learning in a different way (95%); authentic assessment is a measurement of important abilities that stimulate the application of activities to real life (95%); and authentic assessment is used on difficult subjects (90%) (Table 2). Woolfolk (2004) reported that authentic assessment involves the ability to use knowledge to perform tasks that are encountered in real life.

Table 2. Knowledge of Using Authentic Assessment by Lecturers*

Items	True	False
Authentic assessment requires students to apply skills and abilities as they would in real life.	40(100)	0(0)
Authentic assessment means presenting students with tasks that are directly educational instead of indirectly meaningful.	35(87.5)	5(12.5)
Authentic assessment involves the direct examination of student's ability to use knowledge to perform a task that is encountered in real life.	40(100)	0(0)
Authentic assessment is measurement of important abilities that stimulate the application of activities to real life.	38(95)	2(5)
Authentic assessments assess the ability to do.	37(92.5)	3(7.5)
Students are more engaged in active learning.	38(95)	2(5)
There are more opportunities to observe the process students use to arrive at their answer or response in authentic assessment.	38(95)	2(5)
Students who do not do well in paper and pencil technique have an opportunity to show their learning in a different way.	38(95)	2(2)
Authentic assessment contributes to lecturer's empowerment by expanding their role in developing assessment and their active participation in actual scoring.	38(95)	(2)
Authentic assessment force lecturers to identify multiple, specific criteria for judging success.	32(80)	8(20)
In authentic assessment consistency is hard to achieve.	34(85)	6(15)
Authentic assessment leads to unreliability of ratings of performance across teachers or across time for the same teacher.	21(52.5)	19(47.5)
Authentic assessment requires time and effort to use.	22(55)	18(45)
Authentic assessment may lead to biasness.	30(75)	10(25)
Authentic assessment requires retraining or in servicing of lecturers since they may require using new approaches to teaching.	26(65)	14(35)
Authentic assessment creates more work for the lecturers.	28(70)	12(30)
Authentic assessment is used on practical subjects only.	22(55)	18(45)
Students should be observed while performing a task.	15(37.5)	25(62.5)
Only the products should be assessed.	29(72.5)	11(27.5)
Authentic assessment motivates students.	19(47.5)	21(52.8)
Students find authentic assessment boring.	13(32.5)	27(67.5)
Authentic assessment is used on difficult subjects.	4(10)	36(90)
Authentic assessment should be used in all the topics	9(25)	30(75)

*Figures represent frequency and those in parenthesis are percentages

Table 3. Use of Authentic Assessment

	Frequency	Percentage
Use of authentic assessment		
Yes	19	47.5
No	21	52.5
Reasons for use		
To be fair and accurate	4	10
Need time for individual student to be assessed	9	22.5
Course is very practical	8	20
To stimulate students	8	20
It has high reliability	2	5
To expose students to real life situation	9	22.5

Approximately 47.5% of lecturers use authentic assessment while 52.3% do not use authentic assessment. The reasons for this trend as indicated by lecturers in decreasing order of importance are (1) need time for individual student to be assessed (22.5%); (2) to expose students to real life situation (22.5%); (3) courses are very practical (20%); (4) to stimulate students (20%); (5) to be fair and accurate (10%) and (6) it has high reliability (5%). This will have implications on competence acquisition by students in their different areas of specializations (French, 2003).

Most of the lecturers (90%) indicated that authentic assessment is time consuming; 80% showed that authentic assessment creates more work for the lecturers and about 68% reported that authentic assessment technique leads to biasness if fewer items are used (Table 4). Other constraints listed by the lecturers are unreliability of ratings (62.5%) and the difficulty in formulation of assessment criteria (62.5%). The use of authentic assessment requires substantial amount of time to allow students to have adequate opportunity to perform each tasks. Linn and Miller (2005) reported that authentic assessment is time consuming for teacher to prepare and implement, and it can also lead to biasness (Race et al., 2005). Students' performance on one tasks provide little information about performance on another tasks (Ntiko, 2001).

The result of multiple regressions on the determinants of the use of authentic assessments by lecturers shows that the independent variables were significantly related to use of authentic assessments with F value of 4.67, $p < 0.05$ (Table 5). Also, R value of 0.84 showed that there was a strong correlation between independent variables and use of authentic assessments. The result further predicted 71% of the variation in use of authentic assessments by lecturers. Significant determinants were teaching experience ($t = 3.61$), educational level ($t = 4.36$), holding administrative positions ($t = -4.71$) and knowledge of authentic assessments ($t = -3.90$). It implies that the more years of teaching experience and the higher the educational level, the more the use of authentic assessments (Table 5). Also, knowledge is a predictor of use of authentic assessment technique; and thus, the higher the knowledge the more the use of the technique. However as lecturers hold more administrative positions; the use of authentic assessments would decrease.

Table 4. Constraints to Use of Authentic Assessment

CONSTRAINTS	Yes	No
Time consuming	36(90)	4(10)
Creates more work for the lecturer	32(80)	8(20)
Lead to biasness if fewer items are used	27(67.5)	13(32.5)
Lead to unreliable of ratings	23(62.5)	15(37.5)
It is difficult to formulate assessment criteria that will cater for a range of ways of giving a performance	25(62.5)	15(37.5)
Judgment and scoring is subjective	23(57.5)	17(42.5)
Students find authentic assessment boring	16(40)	24(60)
Abilities, attitudes and skills are not easy to assess through authentic assessment	9(22.5)	31(77.5)
Lecturers do not have time to use authentic assessment	14(35)	26(65)
Students are not engaged in active learning	6(15)	34(85)

Table 5. Determinants of Use of Authentic Assessment Techniques among Lecturers

Variables	Regression coefficients	SE	t*
Intercept	-7.92	1.91	-4.15
Gender	-1.04	2.75	0.37
Age	0.24	0.23	1.04
Teaching experience	5.13	1.42	3.61*
Educational level	7.36	1.69	4.36*
Job designation	-5.13	5.66	-0.91
Household size	0.76	4.53	0.16
No of committees	3.06	2.53	1.21
Holders of administrative positions	-6.74	1.43	-4.71*
Knowledge of authentic assessments	-6.44	1.65	-3.90*
F	4.67		
p	0.00		
R	0.84		
R Square	0.71		

*Significant at P = 0.05

Summary

The findings of the study have revealed that most lecturers at the Botswana College of Agriculture are male, having PhD as educational qualification, with long years of teaching experience and belong to several committees in the College. More than half of the lectures do not use authentic assessment technique. The study also reveals that knowledge influences the use of authentic assessment technique. Lecturers are knowledgeable on items of assessment such as authentic assessment require students to apply skills and abilities as they would in real life; authentic assessment involves the direct examination of student's ability to use knowledge to perform a task that is encountered in real life; in authentic assessment there are more opportunities to observe the process students use to arrive at their answer or response in authentic assessment; students who do

not do well in paper and pencil technique have an opportunity to show their learning in a different way; authentic assessment is measurement of important abilities that stimulate the application of activities to real life; and authentic assessment is used on difficult subjects. The most prominent constraint to the use of authentic assessment technique is that it is time consuming. This study recommends that the use of authentic assessment technique should be popularized among lecturers since it will improve skill acquisition and develop critical thinking ability among the graduates of the College.

Literature Cited

Airasian, P.W. 2005. Classroom assessment: Concepts and applications. 5th ed. Boston, MA: McGraw-Hill.

Fook, C.Y. and G.K. Sidhu. 2010. Authentic assessment and pedagogical strategies in higher education journal of social sciences 6(2): 153-161.

French, D. 2003. A new vision of authentic assessment to overcome the flaws in high stakes testing. www.ccebos.org/french.msj.9.03.doc. Middle School Journal 35(1). Accessed January 2010.

Hall, J.M. 2004. Authentic assessment and productive pedagogies in pre-service teacher education. In: Proc. AARE November 29, 2004. http://www.aare.edu.au/04pap/hal04850.pdf. Melbourne University. Accessed January 2010.

Leach, L., G. Neutze, N. Zepke. 2001a. Autonomy and accountability in the assessment of learning. New Zealand Journal of Adult Learning 29(2): 46-63.

Leach, L., G. Neutze, N. Zepke. 2001b. Assessment and empowerment: Some critical questions. Assessment and Evaluation in Higher Education 26(4): 293-305.

Linn, R.L. and M. Miller. 2005. Measurement and assessment in teaching. Upper Saddle River, NJ: Pearson Prentice Hall.

Ntiko, K. 2001. Assessment. Routledge: Danton Green.

Palm, T. 2008. Performance assessment and authentic assessment: A conceptual analysis of the literature. http://pareonline.net/getvn.asp?v=13&n=4. Practical Assessment Research and Evaluation 13(4).

Race, P. 2001. 2000 Tips for lecturers. London, ENG: Phil Race Kogan Page limited.

Race P., S. Brown, and B. Smith. 2005. 500 Tips on assessment. London, ENG: Routledge Falmer.

Taras, M. 2002. Using assessment for learning and learning from assessment. Assessment and Evaluation in Higher Education 27(6): 501-10.

Woolf, H. 2004. Assessment criteria: Reflections on current practices. Assessment and Evaluation in Higher Education 29(4): 479-93.

Woolfolk, A. 2004. Educational psychology. 9th ed. Boston, MA: Pearson Education Inc.

Explaining Student Cognition during Class Sessions in the Context Piaget's Theory of Cognitive Development

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Abstract

The purpose of this study was to explain student cognition during class sessions in the context of Piaget's Theory of Cognitive Development. The objective of the study was to describe comprehensively Piaget's active experience influence through six variables: four professor variables (cognitive level of professor discourse, cognitive level of professor questions, cognitive level of course objectives, and percent of lecture used during class sessions), and two student variables (student engagement and cognitive level of student questions) and, specifically, to describe their relationship to student cognition, which has not previously been operationally defined as it is defined in this study. Using a regression model, professor discourse and the percent of lecture used during class sessions explained more of the variance in student cognition. Recommendations included increasing professor and student awareness of the ability to teach and think using formal operations strategies for increased cognitive development, and to conduct further research to explain independent variables affecting student cognition.

Introduction

Critics of higher education believe that the university system is failing in the preparation of students (Tom, 1997). The Boyer Commission on Educating Undergraduates in the Research University (1998) advocated that students are not being prepared sufficiently to think beyond the lower levels of cognition. If a purpose for higher education is to meet the demand for high quality students to enter the workforce, universities and colleges must examine that which is occurring in their classrooms (Whittington, 2003), and be ready to produce evidence of that which has occurred (Brown and Lane, 2003) that contributed to critical thinking and problem solving for entry-level employment and beyond.

To meet this accountability challenge, Nordvall and Braxton (1996) recommended examining course-level academics to identify institutional quality, and advocated Bloom's Taxonomy (Bloom et al., 1956) for assessing level of understanding related to course content. Similarly, Sanders (1966) proposed using Bloom's Taxonomy as a way of observing and identifying levels of cognition for questions that were being asked by instructors. Bloom et al. (1956) stated that the taxonomy was designed for classifying student behaviors. The authors of the taxonomy believed that student and teacher behaviors could be observed and could be classified in a variety of content areas and educational levels (Bloom et al., 1956).

Woolfolk-Hoy (2004) suggested strategies for effective teaching appropriate for Piaget's stages of cognitive development. In the preoperational stage, the teacher uses actions and verbal instruction (lower level teaching strategies). Teaching in the concrete and formal operations stages requires higher-level teaching strategies. For example, concrete operations strategies involve hands-on learning, performing experiments and testing of objects while teaching in the formal operations stage involves giving students the opportunity to advance their skills in scientific reasoning and problem solving by offering open-ended projects, and exploring hypothetical possibilities (Woolfolk-Hoy, 2004). The level of cognitive development of a student may impact the level of difficulty in the transition to the undergraduate environment (Markwell and Courtney, 2006). At what Piagetian stage are our college students operating, and are our college of agriculture professors providing cognitive development opportunities appropriate for these stages of cognitive development? Transfer of learning is increased when students engage in materials are higher cognitive levels. If transfer of learning is not the primary objective of our institutions of higher education, the question begged is, "What is the relevance of formal schooling?" (Pugh and Bergin, 2006, p. 156). "One purpose of postsecondary education is preparing

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students for their future professional lives" (Thompson et al., 2003, p. 133). To meet this purpose, students' critical thinking abilities must be examined and explained in the context of teaching and learning in higher education.

Theoretical and Conceptual Frameworks

Piaget introduced his biologically-motivated Theory of Cognitive Development early in the last century, and from that time to today, educators and researchers have eagerly worked to exhibit a link between students' cognitive stage of development and their capacity for learning (Markwell and Courtney, 2006). Piaget (1964) believed that learning came prior to development.

In his theory of Cognitive Development, Jean Piaget posited that individuals did not advance one distinct step at a time through the stages, nor that progress was automatic. In fact, Piaget suggested viewing cognitive development as a continuum involving the interaction of four influences: maturation, active experience, social interaction, and a general progression of equilibrium (Piaget, 1961). Wadsworth (2004) stated, "Movement within and between stages of development is a function of these factors and their interaction" (p. 28).

A paucity of current research exists regarding the cognitive stage of development of college students. Cohen and Smith-Gold (1978) did find that the two cognitive stages at which most college students are operating are concrete operations and formal operations. The researchers cited several studies showing that the transition through the developmental stages occurs at much later ages, and that some individuals never obtain formal operations. Schwebel (1975) in a study of first-year college students found that formal operations, such as thinking in abstractions and logically, occurred much later in some people or not at all, and that many college students failed to attain full operational thinking. Cohen and Smith-Gold (1978) found, with a paper-pencil test, that a majority, 75%, of the students were not at the formal operations level when entering college. Pascarella and Terenzini (1991) stated that evidence suggests that close to half of entering college students are not operating at advanced stages of cognitive development and that postsecondary education plays a key role in exposing students to experiences that encourage development. Foster et al., (2009) reported results regarding Piagetian stage of cognitive development that aligned with previous findings with a majority of students not operating at the formal operations level. In addition, Bee (2000) stated that studies based on Piaget's model reveal that only half of adults function at the level of formal operations.

Piaget (1964) stated, regarding the stages of cognitive development, "although the order of succession is constant, the chronological ages of these stages varies a great deal" (p. 178). Woolfolk (2007) wrote, "Some students remain at the concrete operational stage throughout their school years, even throughout life. However, new experiences, usually those that take place in school, eventually present most students with problems they cannot solve using concrete operations" (p. 35).

Piaget further theorized that teachers had little impact on the maturation influence, but teachers, through the active experience influence, provided exploration, observation, testing, and information organization, all of which were likely to alter thinking processes. In addition, Piaget felt that teachers would impact the social transmission influence (i.e. learning from others) depending on the stage of cognitive development the student had already reached when entering a classroom relationship with the instructor.

Building upon Piaget's (1970) active experience influence, the cognitive level of classroom activity can be framed with assistance from Bloom's Taxonomy (Bloom, 1964) which is useful for documenting the cognitive levels at which teachers and learners process classroom content. Bloom's et al. (1956) six-step hierarchical system of thought processing (knowledge, comprehension, application, analysis, synthesis, evaluation) moves from the knowledge level, emphasizing subject matter recall, to the evaluation level, that entails making judgments.

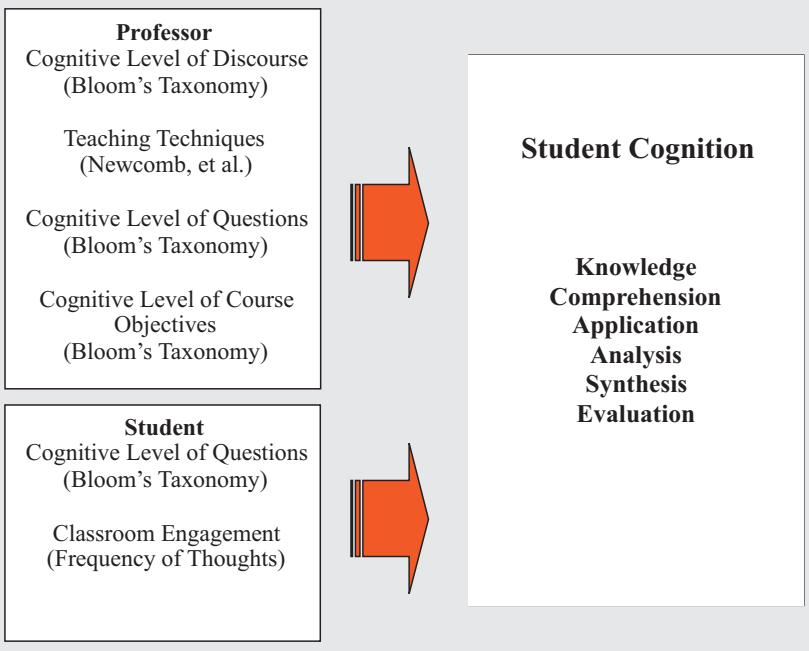

Figure 1. Conceptual Framework of Proposed Factors Influencing Student Cognition

Each level is reflected through cognitive classroom activity.

Given that learning is enhanced by increasing the percentage of student and instructor cognitive classroom activity occurring at the higher levels of cognition, Bloom's Taxonomy provides focus and direction to teachers who desire to enhance the quality of teaching and learning in their class sessions (Bowman and Whittington, 1994). Therefore, based upon Piaget's (1970) conclusion that activity influences student thinking, four professor variables and two student variables were examined in this study to explain student cognition during class sessions (see Figure 1). Student cognition, in this study, was operationally defined as a mathematical computation derived from measuring and assessing student thoughts during class sessions and applying a cognitive weight to students' brain processes during class (see Instrumentation).

Purpose and Objectives

The purpose of this research was to explain student cognition, those levels at which students were thinking based on classroom engagement, during class sessions in the context of Piaget's Theory of Cognitive Development. The objective of the study was to comprehensively describe Piaget's active experience influence through six variables; four professor variables (see Figure 1) and two student variables (see Figure 1). Specifically, the objective of the study was to describe the relationship of these six variables to the dependent variable, student cognition. Student cognition has not previously been operationally defined as defined in this study, nor has student cognition been explained, in a regression analysis.

Methods

The researcher met with all department chairs in the college of agriculture (N = 8), at a large land-grant university in the Midwest. The researchers explained the study and asked the department chairs to nominate three faculty members from their departments who received good student evaluations, positive student exit interview data, and favorable annual reviews of teaching. These teachers were identified as being good, and it should be noted that this may bias the results when compared with teachers with different skills and abilities. Individual appointments were scheduled, with those whom were nominated, to explain the study (a protocol was used such that all professors received identical information) and to seek their participation. Professors were informed of the importance of the study, the timeline, and the events that would take place in their classrooms as a result of their participation.

Twelve nominated faculty members, across all disciplines in the college, participated. The researchers scheduled observations and videotaping for each professor's class session two times during the quarter. However, scheduling conflicts prevented two observations for three of the professors. In-class observations were conducted by two researchers.

In addition, 21 students participated in the study; one student from each observed class session was randomly selected from the professor's class roster to participate in the student think-aloud protocols. As advocated by Kucan and Beck (1997), the think-aloud protocols had to be administered as immediately as possible to the time of the class session. Therefore, for students to be eligible for the study, they could not have academic commitments immediately following the scheduled class session observation. The think-aloud protocols were conducted by asking the students to watch a videotape of the class session they had just attended and record, using a hand-held cassette recorder, all that they were thinking during the class session. These thoughts were then transcribed and analyzed using Bloom's Taxonomy (1956).

Instrumentation

Six instruments were used to measure the professor and student variables. In each instrument in which Bloom's Taxonomy was used as the cognitive framework, content validity was based upon its direct development from Bloom's Taxonomy (1956) and the support, from theory and evidence (Ary et al., 2002), generally given to Bloom's hierarchy of cognitive behaviors. Based originally upon the cognitive levels identified by Bloom et al., Pickford and Newcomb (1989) developed a system to weight each of the cognitive levels. The cognitive factors' weight increases as the level of cognition increases; thus, awarding more overall weight to the higher levels of cognition.

Cognitive Level of Professor Discourse

The Florida Taxonomy of Cognitive Behavior (FTCB) was used in this study to determine the cognitive level of professor discourse during a class session observation (Webb, 1970). During each class session, the total number of cognitive behaviors that the professor displayed was recorded using the FTCB. The total number of observations per professor was summed to give an overall frequency at each cognitive level for each individual professor. A percentage of teaching behaviors was then determined for each cognitive level of professor discourse. The cognitive weighting factor (Pickford and Newcomb, 1989) for each level of cognition (see Table 1) was multiplied by the percentage for each level of cognition to yield a cognitive weighted score for professor discourse at each level of cognition. The cognitive weighted scores for professor discourse from each level of cognition were summed to yield a total cognitive weighted score for professor discourse during each class session.

Intra-rater reliability for the instrument was assessed using observations of two videotapes of

teaching. The overall intra-rater reliability was $r_{(9\ weeks)}$ = .91. Inter-rater reliability was established for this study by having an expert in cognition research complete an assessment of a sample videotape. The inter-rater reliability was r = .94.

Table 1. Cognitive Weighting Factors

Level of Cognition	Weighting Factor *(Professor discourse)*	Weighting Factor *(Questions, objectives, and student cognition)*
Knowledge	.10	.10
Translation	.20	.20 (Comprehension)
Interpretation	.25	.20 (Comprehension)
Application	.30	.30
Analysis	.40	.40
Synthesis	.50	.50
Evaluation	.50	.50

Note. Bloom et al. (1956), Newcomb and Trefz (2005) identified levels of cognition.
Note. Pickford and Newcomb (1989) development of weighting factors.

Professor Teaching Techniques

Frequencies for each group-and individualized-teaching technique, as described by Newcomb et al. (2004), were recorded while viewing each videotaped class session. Percentages for lecture versus non-lecture techniques used by individual professors during class sessions were calculated. Inter-rater ($r_{(3\ weeks)}$ = .84) and intra-rater ($r_{(3\ weeks)}$ = .90) reliabilities were established by watching a videotaped class session for a second time and recording each teaching technique observed. Two individuals, who have studied and experienced multiple teaching techniques, conducted validity tests and determined the instrument to be face and content valid.

Cognitive Level of Professor Questions

The cognitive level of each professor question that elicited student engagement with the class content was categorized using Bloom's Taxonomy (1956). The percentage of professor questions asked at each level of cognition during the class session was calculated. The cognitive weighting factor (see Table 1) for each level of cognition was then multiplied by the percentage of professor questions at each level of cognition to yield a cognitive weighted score for professor questions. The cognitive weighted scores for professor questions at each level of cognition were summed to yield a total cognitive weighted score for professor questions. Inter-rater ($r_{(3\ weeks)}$ = .93) and intra-rater ($r_{(3\ weeks)}$ = .84) reliabilities were established. The instrument was deemed to be face and content valid.

Cognitive Level of Course Objectives

Course objectives provided by the course syllabi were analyzed and categorized by cognitive level using Bloom's Taxonomy (1956). A percentage for course objectives written at each level of cognition was calculated by dividing the number of course objectives at each level of cognition by the total number of course objectives. The cognitive weighted score for course objectives was calculated at each level of cognition by multiplying the percentage of course objectives at each level of cognition by the appropriate weighting factor (see Table 1). The cognitive weighted scores for course objectives at each level of cognition were summed to yield a total cognitive weighted score for course objectives.

The intra-rater reliability for the cognitive level of course objectives was $r_{(3\ weeks)}$ = .92. An expert in writing course objectives and cognition completed inter-rater reliability (r = .98). The cognitive framework was Bloom's Taxonomy (1956).

Cognitive Level of Student Questions

Questions asked by students during class sessions were analyzed and categorized by cognitive level using Bloom's Taxonomy (1956). A percentage for cognitive level of student questions was calculated for each level of cognition by dividing the number of questions at each cognitive level by the total number of questions asked by students during class sessions. The cognitive weighting factor (see Table 1) for each level of cognition was then multiplied by the percentage of student questions at each level of cognition to yield a cognitive weighted score for student questions at each level of cognition. The cognitive weighted scores for student questions at each level of cognition were summed to yield a total cognitive weighted score for student questions. Inter-rater ($r_{(3\ weeks)}$ = .90) and intra-rater ($r_{(3\ weeks)}$ = .88) reliabilities were established by watching a videotaped class session for a second time and recording the level of cognition for each question asked by students during the class session.

Classroom Engagement

Classroom engagement was recorded based on students' completion of think-aloud protocols. Student thoughts were transcribed and each thought was categorized into one of six thought-types. The six thought-types, based on previous research (Lopez and Whittington, 2000), were: (1) thoughts or observations about the professor, (2) nonsense or unrelated thoughts, (3) thoughts connected to previous learning, (4) thoughts about past experiences prompted by class subject matter, (5) deeper learning/questioning thoughts, (6) thoughts about behavior that got/maintained attention. Student thoughts that were categorized into thought-type 3, 4, 5, or 6 were deemed engaged thoughts. Engaged thoughts were directly related to, or were prompted by the course subject matter.

Reliability was established using a sample transcript and recording the level of student engagement during the class session. The intra-rater reliability for student engagement was $r_{(3\ weeks)} = .92$. Another individual, who was familiar with student engagement and teaching/learning, analyzed a sample transcript to establish inter-rater reliability (r = .89). Two students, who have studied and been trained in cognition research, analyzed face and content validity for this instrument. The raters indicated that the instrument was appropriate for categorizing student thoughts.

Student Cognition

All classroom engagements, acquired from the think-aloud protocol sessions, were classified into one of the six levels of Bloom's Taxonomy (1956), and a percentage was calculated for each cognitive level. The cognitive weighting factor (see Table 1) for each level of cognition was then multiplied by the percentage of classroom engaged thoughts at each level of cognition to yield a cognitive weighted score for student cognition at each level of cognition. The cognitive weighted scores for student cognition at each level were summed to yield a total cognitive weighted score named student cognition. Reliability was established using a sample transcript, and recording the level of cognition for each student thought during the class session. Intra-rater reliability for student cognition was $r_{(3\ weeks)} = .94$ and inter-rater reliability was (r = .91). The cognitive framework was Bloom's Taxonomy (1956).

Data Analysis

All professor and student data were entered into SPSS 14.0. Descriptive statistics were generated for each variable. A linear regression model, using the Enter method, was completed to explain the professor and student variables that influenced student cognition during class sessions. Four professor variables and two student variables (see Figure 1) were entered into the regression model at the ratio level of measurement.

Results

In Table 2, the descriptive statistics related to professor variables and student variables are displayed. The total cognitive weighted score for professor discourse mean was 18.95 *(SD = 4.26)*, indicating that the total cognitive weighted score average for professor discourse was between the knowledge and comprehension levels of cognition.

Professors used lecture as a teaching technique 56% of the time *(M = 55.76, SD = 26.28)*. Professor questions asked during class sessions carried a total cognitive weighted score for professor questions mean of 23.44 *(SD = 10.16)*, indicating that the total cognitive weighted score for professor questions was between the comprehension and application levels of cognition. Course objectives yielded a total weighted score for course objectives mean of 21.29 *(SD = 6.22)*. The objectives were primarily written at the comprehension level of cognition.

As can be seen in Table 2, for student variables, the mean total cognitive weighted score for student cognition (dependent variable) was 24.20 *(SD = 5.35)*. A total cognitive weighted score for student cognition of 24.20 was categorized between the comprehension and application levels of cognition. Student cognitive level of questions yielded a total cognitive weighted score for student questions mean of 17.93 *(SD = 13.57)*, indicating that the average cognitive level of student questions during class sessions was between the knowledge and comprehension levels of cognition. The percent of classroom engaged thoughts during class sessions was 42%.

As can be seen in Table 3, correlations between professor variables and total cognitive weighted score for student cognition were .501 (substantial) for total cognitive weighted score for professor discourse and .511 (substantial) for course objectives (Davis, 1971). Therefore, as the total cognitive weighted score for professor discourse and the total cognitive weighted score for course objectives increased, the total cognitive weighted score for student cognition increased substantially. As professor use of lecture increased, the total cognitive weighted score for student cognition decreased moderately (-.489).

Table 2. Descriptive Statistics Related to Professor and Student Variables

	Mean	SD	n
Total cognitive weighted score for student cognition	24.20	5.35	21
Total cognitive weighted score for professor discourse	18.95	4.26	21
Total cognitive weighted score for professor questions	23.44	10.16	21
Total cognitive weighted score for course objectives	21.29	6.22	21
Total cognitive weighted score for student questions	17.93	13.57	21
Percent of classroom engagement for students	41.72	17.6	21
Percent of lecture for professors	55.76	26.28	21

As can be seen in Table 4, given the small number of class sessions observed in this study (n = 21), the Adjusted R-square is the appropriate measure of interest for the model. Thus, 15.4% of the variance in

Table 3. Correlations for Total Cognitive Weighted Score for Student Cognition to Professor and Student Variables

	TCWSPD	Lecture (%)	TCWSPQ	TCWSCO	TCWSSQ	Engaged thought (%)
TCWSST	.501	-.283	.069	.511	.350	.024
TCWSPD		-.489	.002	.338	.467	-.172
Lecture (%)			-.244	-.258	-.041	.369
TCWSPQ				.338	-.132	-.307
TCWSCO					.239	-.050
TCWSSQ						-.034

Note. TCWSST = Total Cognitive Weighted Score for Student Cognition; TCWSPD = Total Cognitive Weighted Score for Professor Discourse; TCWSPQ = Total Cognitive Weighted Score for Professor Questions; TCWSCO = Total Cognitive Weighted Score for Course Objectives; TCWSSQ = Total Cognitive Weighted Score for Student Questions.

the dependent variable, student cognition, can be explained by the six independent variables (four professor variables and two student variables) entered into the model.

Table 4.Model Summary for Professor and Student Variables to Total Cognitive Weighted Score for Student Cognition

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.639	.408	.154	4.92

Conclusions/Implications/ Recommendations

Professors in this study are delivering content to students at the lowest cognitive levels during class sessions. Professor discourse, professor questions, and course objectives were found to be at the two lowest levels of Bloom's Taxonomy (knowledge and comprehension; 1956). Piagetian theory indicates that the professors in this study were using strategies best used with students operating at the preoperational cognitive stage of development, which is not the stage of development expected for college students.

Students, during the class sessions observed and recorded, were not being cognitively challenged to operate at higher levels for further cognitive development. Professors of these classes, therefore, should expect students to operate at higher cognitive levels after professors make conscious changes to write course objectives, plan classroom questioning, and deliver course content using strategies for formal operations of cognitive development. Porter and Brophy (1988) advocated that a professor's ability to address both low and high levels of cognition aid in promoting higher levels of student thinking.

Professors are often unaware of the cognitive levels of their current practices and behaviors (Newcomb and Trefz, 2005). However, most, upon learning of higher cognitive classroom techniques and strategies, adjust their practices to enrich their learning environments (Bowman and Whittington, 1994) including enhanced student cognition.

Students in the study are asking questions and engaging in content at the lowest cognitive levels during class sessions. Student questions and student cognition were found to be at the two lowest levels of Bloom's Taxonomy (knowledge and comprehension; 1956). Students must be able to think critically and to analyze information that has been presented to them (Education Commission of the States, 1995). If students are thinking primarily at lower levels of cognition during class sessions, critics of undergraduate education may be correct in stating that undergraduate students are not prepared to think at higher levels of cognition after leaving the university (Tom, 1997) and entering employment.

Students in the study are cognitively engaged in class content, during class sessions, less than half of the session. Students need to be engaged in the class session for meaningful learning to occur (Piaget, 1970; Woolfolk, 2001). Students not engaged with the class content are not able to retain and transfer the information for future use. Research (Barr and Tagg, 1995; Boggs, 1995) shows that students retain information better if they are active in their learning. Professors should use strategies, such as professor questions (Blosser, 2000) that guide students through the course content, and planned student activities (King, 1993), to encourage student thought and engagement during class sessions. When professors fail to assist students with developing a deeper understanding that will enable them to apply their knowledge in new and challenging situations, the full potential of education cannot be realized (Newcomb and Trefz, 2005).

The cognitive level of professor behaviors affects student cognition during class sessions. Lecture by itself does not often allow for active learning on the part of the student (Mangurian et al., 2001), but by employing other teaching techniques in the classroom, professors can help students learn (Bonwell and Eison, 1991).

Further research must explore other variables, among wider student populations, that explain student cognition during class sessions. Environment variables (Fraser, 1998; Fassinger, 2000) are known to influence learning, so discovering the extent to which additional professor, student, and environment variables are related will improve

classroom practice. For example, Piaget's (1970) maturation (student variable), Fassinger's (2000) classroom climate (environment variable), and Weimer's (2002) student-centered techniques (professor variable), to name a few; need to be explored for potential relationships that explain student cognition, as it was defined in this study.

Literature Cited

Ary, D., L.C. Jacobs, and A. Razavieh. 2002. Introduction to research in education. 6th ed. Belmont, CA: Wadsworth.

Barr, R.B. and J. Tagg. 1995. From teaching to learning - A new paradigm for undergraduate education. Change: The Magazine of Higher Learning 27(6): 12-25.

Bee, H.L. 2000. Journey of adulthood. 4th ed. Englewood Cliffs, NJ: Prentice Hall.

Bloom, B.S. 1964. Taxonomy of educational objectives: Handbook 1, cognitive domain. 2nd ed. New York: Longman.

Bloom, B.S., M.D. Engelhart, E.J. Furst, W.H. Hill, and D.R. Krathwohl. 1956. Taxonomy of educational objectives. The classification of educational goals. Philadelphia, PA: David McKay Company, Inc.

Blosser, P.E. 2000. How to ask the right questions. Arlington, VA: National Science Teachers Association.

Boggs, G.R. 1995. The learning paradigm. Community College Jour. 66(3): 24-27.

Bonwell, C.C. and J.A. Eison. 1991. Active learning: Creating excitement in the classroom. ASHE-ERIC Higher Education Report No. 1. Washington, D.C.: The George Washington Univ., Graduate School of Education and Human Development.

Bowman, G.L.T. and M.S. Whittington. 1994. Comparison of teaching among professors assessed as implementing higher levels of cognition in their classroom discourse. NACTA Jour. 38(4): 11-14.

Boyer Commission on Educating Undergraduates in the Research Univ. 1998. Reinventing undergraduate education: A blueprint for America's research universities. Stony Brook, NY: Carnegie Foundation for the Advancement of Teaching.

Brown, M.C. and J.E. Lane. (eds.). 2003. Studying diverse institutions: Contexts, challenges, and considerations. Hoboken, NJ: Wiley Periodicals, Inc.

Cohen, E. and D.A. Smith-Gold. 1978. Your students cognitive functioning: An important factor in readiness to learn. In: Proc. Annu. Conference of Western College Reading Association 11, 31-34.

Davis, J.R. 1971. Elementary survey analysis. Upper Saddle River, NJ: Prentice Hall, Inc.

Education Commission of the States. 1995. Making quality count in undergraduate education. Denver, CO: Education Commission of the States.

Fassinger, P.A. 2000. How classes influence students' participation in college classrooms. Jour. of Classroom Interaction 35(2): 38-47.

Foster, D.D., M.S. Whittington, and J. Bookman. 2009. Piaget's stages of cognitive development: Have college students reached formal operations? In: Proc. of the North Central American Association for Agr. Education Research Conference, 249-259. http://www.aaaeonline.org/uploads/allconferences/29902009-NCAERC-Links2-CLB.pdf.

Fraser, B.J. 1998. Classroom environment instruments: Development, validity, and applications. Learning Environments Research 1: 7-33.

King, A. 1993. From sage on the stage to guide on the side. College Teaching 41(1): 30-36.

Kucan, L. and I.L. Beck. 1997. Think aloud and reading comprehension research: Inquiry, instruction, and social interaction. Rev. of Educational Research 67(3): 271-299.

Lopez, J. and M.S. Whittington. 2000. Cognitive level of professors' classroom discourse compared to cognitive levels reached by students during class. Jour. of Agr. Education 41(4): 33-39.

Mangurian, L., S. Feldman, J. Clements, and L. Boucher. 2001. Analyzing and communicating scientific information. Jour. of College Science Teaching 30(7): 440-445.

Markwell, J. and S. Courtney. 2006. Cognitive development and the complexities of the undergraduate learner in the science classroom. Biochemistry and Molecular Biology Education 34(4): 267-271.

Newcomb, L.H., J.D. McCracken, J.R. Warmbrod, and M.S. Whittington. 2004. Methods of teaching agriculture. 3rd ed. Upper Saddle River, NJ: Pearson Prentice Hall.

Newcomb, L.H. and M.K. Trefz. 2005. Toward teaching at higher levels of cognition. NACTA Jour. 49(2): 26-30.

Nordvall, R.C. and J.M. Braxton. 1996. An alternative definition of quality of undergraduate college education. Jour. of Higher Education 67(5): 483-497.

Pascarella, E. and P. Terenzini. 1991. How college affects students. San Francisco, CA: Jossey-Bass.

Piaget, J. 1961. The genetic approach to the psychology of thought. Jour. of Educational Psychology 52(6): 275-281.

Piaget, J. 1970. Piaget's Theory. In Mussen, P. (ed.). Handbook of Child Psychology, 3rd ed. 1: 703-732. New York, NY: Wiley

Piaget, J. 1964. Part I: Cognitive development in children: Piaget development and learning. Jour. of Research in Science Teaching 2(3): 176-186.

Pickford, J.C. and L.H. Newcomb. 1989. Relationship of cognitive level of instruction to students' cognitive level of achievement. NACTA Jour. 33(2): 56-59.

Porter, A.C. and J. Brophy. 1988. Synthesis of research on good teaching: Insights from the

work of the Institute for Research on Teaching. Educational Leadership 45(8): 74-85.

Pugh, K.J. and Bergin, D. 2006. Motivational Influences on transfer. Educational Psychologist 41: 147-160.

Sanders, N.M. 1966. Classroom questions: What kinds? New York: Harper & Row.

Schwebel, M. 1975. Formal operations in first-year college students. Jour. of Psychology 91(1): 133-141.

Thompson, J., B. Licklider, and S. Jungst. 2003. Learner-centered teaching: Postsecondary strategies that promote "Thinking like a professional." Theory into Practice 42(2): 133-141.

Tom, A.R. 1997. Redesigning teacher education. Albany, NY: State Univ. of New York.

Wadsworth, B.J. 2004. Piaget's theory of cognitive and affective development, 5th ed. Boston, MA: Pearson Education, Inc.

Webb, J.N. 1970. The Florida taxonomy of cognitive behavior. In: Simon, A. and E.G. Boyer (eds.). Mirrors for behavior: An anthology of classroom observation instruments 1(6). Philadelphia, PA: Research for Better Schools.

Weimer, M.G. 2002. Learner-centered teaching: Five key changes to practice. San Francisco, CA: Jossey-Bass.

Whittington, M.S. 2003. Teaching that reaches higher cognitive levels. In: Proc. of the Association for Career and Technical Education Research Conference. Orlando, Florida.

Woolfolk, A. 2001. Educational Psychology. Boston, MA: Pearson Education, Inc.

Woolfolk, A. 2007. Educational Psychology. 10th ed. Boston. MA: Pearson Education, Inc.

Woolfolk-Hoy, A. 2004. The educational psychology of teacher efficacy. Educational Psychology Rev., 16: 153-176.

Academic Coaching for Enhanced Learning

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Abstract

The relationship between teachers and students has changed. Many writers have put forth hypotheses and ideas about how the current generation of students (Gen-Y; the "Me Generation") differs from previous generations. Others focus on teaching methods, course strategies, and technological tools that are effective in the new environment. The objective of this research is to investigate the possibility of "academic coaching" for enhanced student responsibility and higher levels of learning. The concept of "academic coaching" refers to a relationship between teachers and students that is proactive, responsive to student learning outcomes, and committed to student success. The teacher/learner relationship becomes less like a formal instructor and more like a coach.

Introduction

M.S. Hunter (2006, p. 9) suggested that student attitudes, behaviors, and experiences are constantly changing, due to differences in world events and culture that shape their growth and development. Many writers have put forth hypotheses and ideas about how the current generation of students (Gen-Y; the "Me Generation") differs from previous generations (Eisner, 2004; Pinder-Grover and Groscurth, 2009; Taylor, 2010). Others have focused on teaching methods, course strategies, and technological tools that are effective in the new environment (Barr and Tagg, 1995; Weimar, 2002; Michaelson et al., 2004).

The objective of this research is to investigate the possibility of "academic coaching" for enhanced student responsibility and higher levels of learning. The concept of "academic coaching" refers to a relationship between teachers and students that is proactive, responsive to student learning outcomes, and committed to student success. The teacher's role becomes less like a formal instructor and more like a coach.

Recently, the author's teaching assignment changed in the Department of Agricultural Economics at Kansas State University. This change provided an opportunity for experimenting with pedagogical methods. The author taught a Junior-level intermediate microeconomics course, AGEC 505, from 1988 to 1994, then was reassigned to the same course in 2008. After the 14-year gap, the author returned to the course with the same syllabus, assignments, teaching style, and expectations as in 1994. This original teaching style was found to no longer fit the learning style and expectations of the students. In 2008, following past experience, lengthy and rigorous weekly assignments were assigned for this rigorous course, the foundation of applied microeconomics. Challenging examinations were administered, with the hope that rigor and difficulty would motivate students to learn the material. All but the best students remained uninspired.

The following year went much better, when "collaborative learning," was introduced to the course. The syllabus was modified to include weekly collaborative, team-based laboratory assignments to replace the homework assignments. The level of rigor remained the same, and the examinations were identical in coverage and difficulty. Oral team exams were included to better engage students and prepare them for the individual examinations. Expectations about student behavior and policies were altered to bring them more in line with a new generation of students. The results included higher levels of learning, more enthusiasm for the course material, and greater willingness to apply economic principles to the issues that arise in everyday life.

Changing from a traditional instructor with rigid expectations to an "academic coach" provided for large enhancements in the learning environment, and higher levels of learning. Teaching college courses is difficult, dynamic, and challenging: the exact impacts of the changes on student learning remain unclear, but some evidence of positive change is discussed and quantitative evidence for higher levels of learning and student satisfaction is presented below.

Background and Literature Review

This research is based on college-level teaching experience and in-depth reading on the topics of "Generation Y," effective instruction, and classroom experiments in academic coaching. The foundation of academic coaching is teachers who take on characteristics, methods, and attitudes of a coach, such as an athletic coach, a "personal trainer," or life coach. The Association of American Colleges and Universities (2002) commissioned a panel that concluded that change in higher education is urgently needed, since increased college attendance has been accompanied by faltering performance of many students. This sentiment is echoed throughout the higher education community. Some writers have emphasized differences in generations. Taylor (2008) points out that in spite of improvement in areas of student-centered learning, outcome-based initiatives, and accountabil-

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ity programs were put in place at most colleges and universities, there remain serious issues in student persistence and completion, meaningful learning, and workplace readiness at many schools (p.3.3). Taylor (2008) also summarized a growing literature on Generation NeXt (also called Millennials or Generation Y) by recognizing that current college students often tend to feel a sense of entitlement, want to negotiate, and will protest vigorously (or leave) if their expectations of ease and instant response, excellent service, and painless success are not met (p. 3.3). In what follows, we will provide an economic explanation for these potential behaviors.

Pinder-Grover and Groscurth (2009) found that the most important characteristics that Millennials bring to the university classroom are their preferences for collaboration, connection, and creating social change. This can be positive for instructors, since research has consistently demonstrated that collaboration and group discussion enhance student learning. Eisner (2004) presented three classroom initiatives created to teach Generation Y students: a performance contract, investigative report, and a class game show.

Perry and Kennedy (2009) reported a large and growing number of underprepared college students. They reported that peer advising of underprepared students, provision of course-specific skills, and tutoring are all good ways to begin to address the increasing problem. The education literature provides two tested strategies to assist struggling students: "Supplemental Instruction," (Blanc et al., 1983) and "Self-Regulated Learning" (Glenn 2010). Supplemental Instruction, according to Blanc et al. (1983), is an academic support system that has used peer advising to teach review sessions to students in challenging courses. Congos and Schoeps (1993) provided empirical evidence that supplemental instruction has produced higher academic performance and greater levels of retention at the University of Missouri-Kansas City.

Glenn (2010) reported on "Self-Regulated Learning," a series of steps that encourage students to evaluate how they study and notice when they are going wrong. Zimmerman (1990) defined self-regulated learning as including three features: (1) use of self-regulated learning strategies, (2) responsiveness to self-oriented feedback about learning effectiveness, and (3) interdependent motivation processes. Self-regulated students select and use self-regulated learning strategies to achieve desired academic outcomes on the basis of feedback about learning effectiveness and skill. Winne (1995) elaborated on self-regulated learning, and provided evidence of the future importance of self-regulated learning. Glenn (2010) reported that explicitly coaching students to think about their study processes and to monitor their learning can pay large dividends. By providing constant feedback, students can see their own strengths and weaknesses. The two "golden rules" of Zimmerman's self-regulated learning are: (1) give students fast, accurate feedback about how they are doing, and (2) make them demonstrate that they actually understand the feedback that has been given (Glenn, 2010). According to Glenn (2010), institutions that have used self-regulated learning have found that (1) the methods have a much greater impact if they are embedded within the course context, and (2) tutoring and counseling aren't enough… a more intrusive strategy is needed to build specific skills. Glenn's concluded that college students of all types, not just obviously struggling students who are assigned to remedial classes, will learn better if they think critically about their own studying (Glenn, 2010). Butler and Winne (1995) highlighted the importance of feedback on student achievement, and synthesize an elaborated model of self-regulated learning based on both educational and psychological literatures.

Weimar (2002) stated that the higher education community has finally discovered learning, and that resources are needed to cultivate and capitalize on that interest. She found it difficult to explain the idea that we have ignored learning for such a long time, finding it more a case of benign neglect than willful rejection (p. xi). Collaborative learning, or group work, has shown students' ability to learn from and with each other (Qin et al., 1995). Weimar (2002) concluded that group work, including collaborative or cooperative learning styles, has gained considerable popularity and wider use. However, Weimar warns that like all other instructional methods, good group learning experiences do not happen automatically (p. 88).

Michaelson et al. (2004) have honed collaborative learning strategies into a more specific framework for teaching "Team-Based Learning." Team-Based learning is a form of small-group learning designed for college classrooms, which included incentive and corrective feedback. The authors claim that groups are transformed into high-performance teams.

An Economic Model of Changes in Higher Education

Many authors have focused on generational differences to explain student changes (Hunter, 2006; Taylor, 2008). However, great understanding can be gained by focusing on the economic determinants of college student decision making. Specifically, a simple model of the demand for college, and for specific college courses, is derived here to enhance our ability to understand how academic coaching might lead to better outcomes than traditional teaching methods. Economic theory asserts that consumer choices can be determined by changes in prices and income, holding tastes and preferences constant (Stigler and Becker, 1977). In this framework, if higher education is considered to be a purchased good, then the

demand for higher education (Q^d), can be considered to be a function of price (or tuition, =P), and income (=M), as in equation (1).

(1) $Q^d = f(P, M, E(R))$

Since a college degree is not only a consumer good, but also an investment in human capital (Becker, 1975), the expected returns (E(R)) of the purchase also determine the demand for college. One of the major determinants of the cost of college (P) is technological change, which places downward pressure on the price of college over time, as new methods of information acquisition and dispersal are discovered and adopted. Technological change also increases the quality of many aspects of higher education, including technology use in the classroom, and the use of the internet for a wide variety of academic tasks.

In the United States (USA), income has increased significantly for college students and their families. Pryor et al. (2008) found that in 2005, entering freshmen came from households with a parental median income of $74,000, 60% higher than the national average of $46,326. This represented a 15percentage point increase from 1971, when students' median family income was $13,100, 45% than the national average of $9,028. These large increases in the standard of living have led to more students choosing to go to college, and greater expectations of the quality of their "purchase." The cost of attending college is also increasing. The U.S. Department of Education (2010) reported that for the 2008–09 academic year, annual prices for undergraduate tuition, room, and board were estimated to be $12,283 at public institutions and $31,233 at private institutions. Between 1998–99 and 2008–09, prices for undergraduate tuition, room, and board at public institutions rose 32% and prices at private institutions rose 24%, after adjustment for inflation.

Although the cost increases are large, they have been more than offset by the expected returns from attending college, so enrollment has increased. According to the U.S. Department of Education (2010), the traditional college-age population rose 14% between 1998 and 2008, which was reflected by an increase of 32% in college enrollment. Between 1998 and 2008, the number of full-time students increased by 37% compared to a 24% increase in part-time students. Higher incomes and higher costs have led to greater levels of search for colleges that prospective students and their parents believe are most attractive. Pryor et al. (2008) provided evidence that in 1967, less than one in five entering college students (19.9%) reported applying to four or more colleges, a figure that has nearly tripled to 56.5% in 2006. Technological change has led to a massive increase in distance education courses. According to the U.S. Department of Education (2008), of the 600 public, four-year colleges and universities in the United States, 88% offered college-level credit-granting distance education courses in 2006-2007. The college experience has changed dramatically, and now includes a much greater number of transfer college credits from other institutions, as well as from distance and evening course programs within the same institution.

With the determinants of the demand for college as a foundation, we can now modify the model, to better understand why academic coaching might provide advantages over traditional pedagogies in the college classroom. The model in equation (1) can be modified to derive the demand for an individual college course, as in equation (2):

(2) $Q^d_i = f(P_i, P_o, Z_i, Z_o)$

For an individual course (=$_i$), demand is determined by both (1) the price of the course (P_i), and the price of close substitute courses ("others" =P_o). Large increases in income and advances in technological change have led to a large set of close substitutes available for virtually all college courses, at most colleges and universities. Not only is price an important determinant of the demand for an individual course, but course characteristics (Z_i) also influence student enrollment and retention within a given college course. Course characteristics include: time offered, location, class size, and course format, and teacher characteristics, such as quality, level of engagement, and energy. Course and teacher characteristics have become increasingly important determinants as incomes increase and search costs and transfer costs have decreased enormously. Notice that this model provides some economic explanation for Taylor's (2008) student demands for "painless success."

Changes in income and technology of education have led to a truly large increase in the number of close substitutes available to students selecting courses and instructors. This gives students, "the power of choice," resulting in a scramble for teachers to conform to the new reality. Hunter (2006) concluded that the days of the 'let them sink or swim' attitude of faculty and staff toward new students are obsolete. Deliberate and intentional efforts to assimilate new students into the institutional culture and environment are essential if institutions are to expect transitional students to thrive (p. 10).

To summarize, the number of options available for each college course has increased dramatically over time, since numerous substitutes exist, including online course and transfer courses. Therefore, students are less willing to accept any course requirement or teacher characteristic that creates stress or tension, relative to the characteristics of many other available courses and teachers. This economic model provides the theoretical foundation behind the idea of academic coaching.

Academic Coaching

Coaching began as an athletic concept, but has evolved into a description of a type of relationship. The International Coach Federation (ICF) defined coaching as an on-going relationship which focuses on clients taking action toward the realization of their vision, goals, or desires. The IFC emphasized that coaching uses a process of inquiry and personal discovery to build the client's level of awareness and responsibility and provides the client with structure, support and feedback. The IFC also asserts that the coaching process helps clients both define and achieve professional and personal goals faster and with more ease than would be possible otherwise.

Academic Coaching, then, can be defined as using a coaching style relationship to enhance student learning. Some firms, and numerous private consultants, offer "academic coaching" services to students for profit. One such company is Inside Track (the citation for Inside Track, together with alcohol.edu and MAP-works below, are for information only, and do not imply endorsement from the author or Journal), which has coached over 250,000 students at over 50 campuses. Inside Track has empirical evidence that their programs have increased student achievement, retention rates, and engagement. Other examples include alcohol.edu, an alcohol coaching program (alcohol.edu, 2010), and MAP-works (making achievement possible), which surveys enrolled students, and provides detailed information about students to their teachers and housing assistants. Programs that provide coaching-style interventions to enrolled college students are growing rapidly, as are websites that offer a great deal of information about issues facing college students and how to assist them. The premise of these for-profit institutions is that some students do not have the necessary skills for adjusting to college life and succeeding academically.

Academic coaching for college instructors starts with this same assumption: that the levels of success and retention are low, and could be improved through appropriate intervention, and changes in teaching style. Retention of students is a common goal for teachers, administrators, and policy makers. Hunter (2006) pointed out, however, that the motivation for enhanced retention varies across groups. She asserted that student-centered faculty and staff embrace sincere desires and altruistic attitudes toward helping students learn and succeed. Institutional leaders understand the very real fiscal cost of student attrition and the equally disturbing public relations consequences of unsuccessful students. Academic coaching provides a strategy to enhance student success, and as a result, retention rates.

The main idea of academic coaching is for the instructor to switch from a dispassionate, disinterested lecturer to an engaged, interested academic coach who is enthusiastic, proactive, and intentional about student success. The most important characteristic of academic coaching is to seek and develop a relationship with students. A coach, or mentor, type of relationship might be more typical at small schools or colleges that take pride in student success. The more teachers learn and know about their students, the better they are able to meet their educational and academic needs.

Early identification of struggling students provides a way to help those who need it, at the appropriate time. Academic coaches take this role seriously, to intervene with feedback that allows the student to move toward positive outcomes. This idea is based on research results of Self-Regulated Learning (Glenn, 2010; Zimmerman, 1990). Academic coaches also provide effective provision of help for students to enhance their learning, and learning outcomes, recognizing that not all students are equipped with academic, study, and social skills at the college level. Teachers who assign homework, labs, exams, projects, and presentations could usefully provide students with information on how to succeed in these tasks. In the past, course assignments were given, with little or no instruction on how to do them. Today, student success is likely to be enhanced with rubrics, instructions, strategies, and any other information about how a successful assignment is to be completed. Teachers can no longer assume that students know what they are looking for. Similar to this, many current students, including many successful students, may lack basic study skills. Since many college credits are earned at the high school level, a growing number of students bring "high school level" study habits to college (Perry and Kennedy, 2009). Academic coaches could usefully make available more information on academic skills to students. Stanford University's Undergraduate Academic Life program provides students with the opportunity to make an appointment with an academic coach, attend workshops on time management, reading and note-taking, and procrastination. Stanford also posts "study tip resources" to provide useful tactics for students on many aspects of college life, including taking exams, note taking, reading, and time management (Stanford University, 2010).

Learning in groups, through collaborative or "team-based" learning, can provide huge benefits to students, through a process of "belonging to a team" (Michaelson et al. 2004; Weimar, 2002). Peer review can provide a great motivation for many students, who may not respond as well to teacher feedback. Peers can also provide useful tutoring, or study sessions, as in the "Supplemental Instruction" paradigm (Blanc et al., 1983; Congos and Schoeps, 1993). Often, students respond well to teacher relationships combined with peer study and review help (Blanc et al., 1983).

Academic coaches can also motivate students with changes in rules, regulations, and course

requirements to better meet student expectations and needs. Changing from a rigid, "old-school" professor to one that accommodates student activities allows instructors to relate better with students, and capture more respect than rules and regulations that have not kept up with the increasing demands placed on undergraduate students.

Quantitative evidence on how well the shift from traditional pedagogical methods to collaborative learning is provided in two ways: student evaluations of teaching (Table 1) and summary statistics of exam scores (Table 2). In Table 1, student evaluation scores are reported for traditional teaching methods (2008) and collaborative, academic coaching methods (2009 and 2010). Student evaluations capture only a portion of what is truly going on in a course, but the average numbers reported here demonstrate enhanced scores for all categories measured. Perhaps the most important score is "Amount Learned," which increased from a 4.5 on a 5-point Likert scale in 2008 to a 4.6 in 2009 and 4.7 in 2010.

Table 2. Summary of AGEC 505 Exam Scores, Kansas State University, 2008-2010

Exam 1	2008	2009	2010
Average	79.9	82.5	85.5
Maximum	99.0	98.0	100.0
Minimum	55.0	60.0	44.0
Standard Deviation	11.9	10.3	9.6
Median	81.0	85.0	87.0
Exam 2	2008	2009	2010
Average	76.7	78.2	80.3
Maximum	99.5	100.0	100.0
Minimum	52.0	53.0	57.0
Standard Deviation	12.2	13.1	11.5
Median	75.3	80.0	80.0
Exam 3	2008	2009	2010
Average	77.3	77.1	77.8
Maximum	98.0	100.0	99.0
Minimum	36.0	51.0	30.0
Standard Deviation	12.6	12.6	13.9
Median	78.8	77.0	80.0

Table 1. Summary of AGEC 505 Student Evaluations, Kansas State University, 2008-2010

Year	Interested In Teaching	Well Prepared	Available for Help	Teacher Effectiveness	Amount Learned	Overall Course Rating	Percent Recommend Course to Others
Traditional Teaching Methods							
2008	4.7	4.7	4.8	4.5	4.5	4.4	89
Academic Coaching, Collaborative Learning							
2009	4.9	4.7	4.8	4.8	4.6	4.7	100
2010	4.8	4.8	4.8	4.7	4.7	4.8	100

Note: Rating Scale: 5=Very High, 4=High, 3=Medium, 2=Low, 1=Very Low.

Table 2 provides evidence of exam performance in AGEC 505 for three spring semester courses, 2008-2010. For the three exams reported, average (mean) and median scores increased in semesters when collaborative learning was included in the course. One exception is Exam 3 in 2009, when average scores decreased from 77.3 to 77.1. This is unlikely to be a statistically significant change. Note that there two additional exams were administered in all three semesters, a fourth midterm and a final exam. The results of these exams are not comparable, since many students have already earned enough points during the first two-thirds of the course that they do not need to make their highest effort to achieve the desired course grade.

Employers have ranked teamwork skills as the most important skill or ability when hiring new employees (Hart, 2006). Although there is no direct evidence on employer attitudes towards the specific changes to incorporate academic coaching in AGEC 505, there exists a great deal of anecdotal evidence that employers are enthusiastic about college courses that enhance teamwork skills.

Maintaining rigor is crucial for instructors who adopt these new teaching practices. This concept may not seem possible, but the story of Elaine Smokewood provides evidence that it can happen (Young, 2010). Smokewood, a 54-year old English professor at Oklahoma City University, is losing her ability to speak due to Lou Gehrig's disease. She argues that she was surprised to learn that she is now able to teach more effectively. Smokewood maintains that she became a totally different kind of teacher by actively listening to her students. Smokewood learned that if she listened carefully, thoughtfully, generously, and nonjudgmentally, her students would delight her with the complexity of their thinking, the depth of their insight, humor, compassion, wisdom, and honesty (Young, 2010). Truly, this is also an example of academic coaching: changing teaching styles to become more in tune with students.

Conclusions

Tinto (1999) made the claim that student learning is the key to student retention. Therefore, the strategy of academic coaching is likely to have a positive impact on student retention, since Tinto showed that the involvement of faculty, and not just student affairs professionals, is critical to institu-

tional efforts to increase student retention. Academic coaching could provide a way for interested faculty to proactively and deliberately try to form healthy working relationships with students. A coaching relationship provides important feedback, support, and challenge to students that allow them to thrive in academics and in life. Some evidence has been provided that altering one's approach in the classroom allows for more engaged learners and higher levels of student learning.

Literature Cited

Alcohol.edu. 2010. http://www.outsidetheclassroom.com.

Association of American Colleges and Universities. 2002. Greater Expectations: A new vision for learning as a nation goes to college. National Panel Report. Washington, D.C.

Barr, R.B. and J. Tagg. 1995. From teaching to learning—A new paradigm for undergraduate education. Change, Nov.-Dec.: 13-25.

Becker, G.S. 1975. Human capital: A theoretical and empirical analysis, with special reference to education, 2nd ed. Chicago, IL: The University of Chicago Press.

Blanc, R.A., L.E. DeBuhr, D.C. Martin. 1983. Breaking the attrition cycle: The effects of supplemental instruction on undergraduate performance and attrition. Journal of Higher Education 54(1): 80-90.

Butler, D.L. and P.H. Winne. 1995. Feedback and self-regulated learning: A theoretical synthesis. Review of Educational Research 65(3): 245-281.

Congos, D.H. and N. Schoeps. 1993. Does supplemental instruction really work and what is it anyway? Studies in Higher Education 18(2): 165-178.

Eisner, S. 2004. Teaching generation Y college students: Three initiatives. Journal of College Teaching and Learning 1(9): 69-84.

Glenn, D. 2010. How students can improve by studying themselves: Researchers at CUNY's graduate center push 'self-regulated learning.' The Chronicle of Higher Education Feb. 7.

Hunter, M.S. 2006. Lessons learned: Achieving institutional change in support of students in transition. New Directions for Student Services No. 114: 7-15.

Inside Track. www.insidetrack.com.

International Coach Federation. www.coachfederation.org.

MAP-works. http://www.map-works.com.

Michaelson, L.K., A.B. Knight, and L.D. Fink. 2004. Team-based learning: A transformative use of small groups in college teaching. Sterling, VA: Stylus.

Peter D. Hart Research Associates, Inc. 2006. How should colleges prepare students to succeed in today's global economy? Based on Surveys Among Employers and Recent College Graduates Conducted on Behalf of: The Association of American Colleges and Universities.

Perry, D.M. and K.E. Kennedy. 2009. Teaching 'Grade 13.' The Chronicle of Higher Education December 13.

Pinder-Grover, T. and C.R. Groscurth. 2009. Principles for teaching the millennial generation: Innovative practices of U-M Faculty. CRLT Occasional Papers. Center for Research on Learning and Teaching, University of Michigan, No. 26.

Pryor, J.H., S. Hurtado, W.S. Korn, and J. Sharkness. 2008. The American freshman: National norms for fall 2007. www.heri.ucla.edu. Higher Education Research Institute at UCLA.

Qin, Z., D.W. Johnson, and R.T. Johnson. 1995. Cooperative vs. competitive efforts and problem solving. Review of Research 65(2): 129-143.

Stanford University. Undergraduate Academic Life. http://ual.stanford.edu/.

Stigler, G.J. and G.S. Becker. 1977. De gustibus non est disputandum. The American Economic Review 67(2): 76-90.

Taylor, M. 2008. Meet the students: Finding common ground between student and institutional goals. 2008 Higher Learning Commission Collection of Papers. Volume 3: Finding Common Ground: Programs, Strategies, and Structures to Support Student Success. Chapter 1: Understanding and supporting all types of Learners 3: 3-9.

Taylor, M. 2010. Teaching generation NeXt: A pedagogy for today's learners. A Collection of Papers on Self-Study and Institutional Improvement, 26th edition. The Higher Learning Commission.

Tinto, V. 1999. Taking retention seriously: Rethinking the first year of college. NACADA Journal 19(2): 5-9.

U.S. Department of Education. 2008. National Center for Education Statistics. Distance Education at Degree-Granting Postsecondary Institutions: 2006-2007 (NCES 2009-044).

U.S. Department of Education. 2010. Institute of Education Sciences. National Center for Education Statistics. Digest of Education Statistics, 2009. Thomas D. Snyder and Sally A. Dillow. April 2010. NCES 2010013.

Weimar, M. 2002. Learner-centered teaching. San Francisco, CA: Jossey-Bass.

Winne, P.H. 1995. Inherent details in self-regulated learning. Educational Psychologist 30(4): 173-187.

Young, J.R. 2010. Taught by a terrible disease. The Chronicle of Higher Education January 3.

Zimmerman, B.J. 1990. Self-regulated learning and academic achievement: An overview. Educational Psychologist 25(1): 3-17.

Why go to College for Agriculture

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(Reprinted from the March 1971 NACTA Journal, pages 14 and 15)

In a random sampling of the 18,000 registered at the University of Georgia, 1490 students were asked questions as to their own motivations and the incentives they attributed to others for going into higher education. It was found that the sample contained 143, all males, who were agriculture majors. This report will summarize the responses made by all the males (699) surveyed in general and these students in particular. Also, a comparison will be made with the results of a similar survey, recently completed by researchers at John Hopkins University, covering 7,948 students at 48 colleges and universities around the nation.

The questionnaire, employed to determine the motivational factors playing a part in the reasons why these University of Georgia students had come to the university. asked the randomly selected student population to list the five most important considerations (in order of importance) which applied to themselves. and to others. of both sexes. The list of possible motives offered for them to choose from included the following:

1. To learn a specific occupation
2. To improve the mind
3. To please parents
4. To make the right contacts
5. To become a better world citizen
6. To be with friends
7. To have fun
8. To surpass their parents
9. To postpone military service
10. To judge better between right and wrong
11. To appreciate the better things of life
12. To, perhaps, help improve society
13. To rear your children better
14. To become more intelligent
15. To become more discriminating
16. To know more about life
17. To find a suitable mate
18. To make use of an earned scholarship
19. To join a fraternity or sorority
20. To succeed in athletics

The questionnaire revealed that a third of the sample had already changed their majors at least once and that 18% were. at present, contemplating another change. Most (83%) were confident that their present choice would be directly connected with a future occupation. Only 4% saw any correlation between it and life in the home. Another 10% were uncertain of its usefulness in any fashion. A few (1%) optimistic souls thought their majors might even be helpful in military areas. In addition, 27% admitted having felt, at one time or another, that college was a waste, and 12% were of this conviction at present.

Why did our agriculture majors come to the university? Their choices, in order of importance, from the list of twenty suggested reasons were as follows:

1. To learn a specific occupation
2. To improve the mind
3. To, perhaps, help improve society
4. To know more about life
5. To rear your children better

For the general male student population sampled in this survey, the choices were as follows:

1. To learn a specific occupation
2. To improve the mind
3. To become more intelligent
4. To know more about life
5. To have fun.

When asked why other boys go to college, the agriculture majors listed:

1. To learn a specific occupation
2. To postpone military service
3. To have fun
4. To make the right contacts
5. To please parents

These selections compare with the motives attributed to most boys by the general male population as follows:

1. To learn a specific occupation
2. To postpone military service
3. To have fun
4. To please parents
5. To join a fraternity

It is obvious that agriculture majors and the general male student body sampled in this survey feel very similarly about the reasons others go to college. The similarity of views is further evident when they were asked why girls enter college. The future farmers thought they came: (1) to find a husband. (2) to have fun, (3) to please parents. (4) to be with friends, (5) to join .a sorority. The males in general

listed the same reasons. in slightly different order of importance, as follows: (1) to find a husband. (2) to join a sorority. (3) to please parents. (4) to have fun. (5) to learn a specific occupation. Neither set of male students credited their female classmates with any serious intentions or expectations from their presence at an institution of higher learning.

The data gathered by the social scientists at Johns Hopkins University revealed very similar reactions when the responses of almost 8.000 freshmen and juniors scattered in 48 colleges over the nation, were tabulated. First among their reasons for attending college was to learn skills for jobs. Next they wanted to know what to do with their lives (also job involved), and to get a "liberal" education. Unlike the Georgia males who did not admit the avoidance of military service as a personal motive (only for other males), 9% of the national male sample did mention this factor. Missing from the consideration of the Georgia group was the possibility of helping to improve society. It did appear third highest in the national survey among the ideas deemed "very important" to them, preceded by preparation for a career: and. at the top, the realization of a purpose and meaning to life. The national sample was also asked what would be most important to them 10 years in the future. In this instance, family life was ahead of the career. But in choosing their life's work they, again. came out for usefulness to society. Only 16% would confess their primary goal was to become very affluent.

What, then, have the respondents to this survey of college motivation told us about themselves and the beliefs about others? Agriculture majors at the University of Georgia appear to be similar and different from the sample of general male students on the campus and in the nation's colleges at large. Paramount in the thinking of most of them is a future job. In a world of increasingly rapid technological changes. they wanted stability and certainty. Abstractions like purpose, meaning, improvement of society are secondary to the overriding goal. Draft-avoidance, being unmanly, is ignored among their personal motives but are not forgotten as attributes for other males safe on campus. It was noted that college males, nationally, also refuse to acknowledge this matter in regard to their own motivation. Perhaps the implication of unmanliness in their presence in a haven of escape and safety may contribute to the unrest on many campuses.

Another source of unease among college males must be their strong belief that college women are all hunters of husbands. The feeling of being a victim of a huntress adds little to the male's serenity. Hunting and having fun is the life of a college girl: and a male who is so seriously (they claim) in pursuit of a career cannot but have doubts concerning their need to be on the college scene. Agriculture majors, also, appear to take a dim view of the seriousness of males not in the same curricular major. The secondary motives of those not in agriculture (having fun, making the right contacts, and parent pleasing) are suspect as well. It can be hoped that their own motives, if honestly presented. will be fulfilled. We need people who want a good job. to improve their minds, to improve society. to know more about life. and to rear a better crop of children. Lots of luck to them.

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Teaching a Specialty Course at Three Land-Grant Universities Through Distance Education

Introduction

Biological control, using beneficial organisms to control insect or weed pests, is a specialty course offered in entomology departments at many Land-Grant institutions. As a specialty course – typically taught at the graduate level – the perspectives and topics taught tend to reflect the experience base or background of the instructor. Such courses often encounter low enrollments, limiting interactions among students or even precluding teaching the class, due to limits on minimum class size. One alternative is to offer a specialty topic as a non-credit summer short course. The Midwest Institute for Biological Control (MIBC) has offered non-credit, specialty summer short courses for more than 20 years. The courses have typically lasted 4 to 8 days, with enrollments of 12 to25 students (mostly graduate students) and 3to6 instructors. Four of the authors (RNW, RJO, JJO, BB) participated in several MIBC courses, and recognized the value of broad perspectives from multiple instructors and the dynamic created by a critical mass of diverse students from different backgrounds and institutions.

The four authors (RNW, RJO, JJO, BB) have taught specialty courses on biological control for 8 to 20 years. The instructors recognized the benefits their experiences with MIBC courses, and sought to replicate those benefits in their own courses by teaching a combined course with multiple instructors at multiple sites, using distance-delivery.

We describe the development of a team-taught course, the logistics and methods used to deliver the jointly taught courses at three Midwestern, Land-Grant universities. The authors adapted their courses to teach a combined course with each instructor located at his or her home institution. The benefits and shortcomings of converting existing courses into a distance-course offered by multiple faculty members are discussed, as is an evaluation of the course conducted by an independent faculty member (RFB).

Distance-Education Course

In spring 2002, the principal instructors offered a course on biological control that linked 23 students enrolled for credit at Purdue University (PU), Iowa State University (ISU) and the University of Illinois (UI). In addition, two off-campus graduate students participated from a UI-extension education facility. The semester-long class, taught twice weekly for 90-minute sessions, included both upper-level undergraduates and graduate students, as each institution typically attracted slightly different enrollees.

Planning involved deciding topical coverage and responsibility, the sequence of topics and activities, and materials needed to support each lecture or activity. One planning session included the course evaluator, who offered development of assessment materials for pre-course, mid-semester, and post-course student evaluations, as well as course evaluations and expectations to be offered by each instructor. The evaluator was not involved in teaching the course but only with the development of the evaluation materials and procedures. The evaluator was selected based upon his credentials as a university-level science educator and curriculum evaluator.

Attributes of Course

Commonalities Across Sites

The first class session was devoted to familiarizing students with the instructors and students at other locations, as well as course expectations. This session also included an introduction to "on-line etiquette" to make the interactions among students and sites more effective. Other resources to enhance the course included developing a chat group that allowed instructors to communicate common information to all students at all sites, and also gave students a chance to discuss those issues and topics that arose during class. The MIBC web site was used for background information and to augment readings, replacing a required text at each school.

The multimedia course used application sharing and video-conference sharing. Each site was equipped with a classroom with one or two video cameras, a document camera, a microphone located either centrally or at each student's chair, and multiple video displays. The UI site served as the course "home," linking all sites and from which the lectures were sent or routed to other locations.

Normally, two lectures per week were presented, linking the sites. Course topics included ecological basis of biological control; methods and measures of biological control; biology of natural enemies; risks of biological control; microbial control; weed biological control; genetically altered natural enemies; and integrating biological control into other management approaches. Each instructor had responsibility for presenting approximately the same number of lectures, with topics taught by the instructor with a particular background or strength. The instructors also assigned articles from the primary literature on various topics and students were assigned to lead

discussions on the papers. Instructors attempted to involve students at all sites in discussions following lectures, summaries of papers and debates. Students at the different sites participated in debates on contemporary and controversial topics in biological control. Four teams of 5 to 6 students were formed, each one composed largely of students from one school. Each team was given a topic and a pro or con position.

Differences Among Sites

Because of different student audiences and different course credits, there were slight differences in the courses at each institution. Two instructors offered optional lab sessions. At one site (PU), these weekly lab sessions focused on identification of key taxa of natural enemies. The second site (UI) had 5 to 6 lab sessions to demonstrate living natural enemies and exercises derived from lectures.

Students enrolled at their home institutions, met the prerequisites and paid tuition and fees determined by their home school. Prerequisites course varied among schools. One (PU) required a course in entomology or permission of the instructor; a second school (UI) had no prerequisites but encouraged students to have taken Integrated Pest Management, Ecology or Insect Ecology; the third university (ISU) allowed entry to any interested student of junior or senior standing.

The Instructors

Although located at different institutions and having different research programs, three of the four instructors had similar backgrounds. Three (JJO, RJO and RNW) were trained in biological control of insects, with the fourth instructor (BB) trained in insect pathology. One (RJO) had more of a background in quantitative ecology and modeling, also taught courses in Insect Ecology and Quantitative Insect Ecology. Two instructors (JJO, RNW) focused on the biology of predatory and parasitic natural enemies used against insect pests, and also had active programs in biological control of weeds. The fourth instructor (BB) is an insect pathologist and has taught insect pathology and co-taught biological control.

Instructors' Pre-Course Expectations

The instructors completed a pre-course survey concerning their expectations for the course. This was the first time they had taught an entire semester-long course using distance-education technology. Their pre-course expectations of benefits included:

- Multiple instructors with strong and varied areas of related expertise
- More student-student interaction
- Larger total enrollment with more sites
- More overall interaction on all levels
- Increased visibility for discipline of Biological Control
- Decreased individual preparation time for instructors

Disadvantages anticipated by the instructors:

- Lack of development of personal relationships
- Tendency for instructor to become "TV personality"

Instructors' Post-Course Evaluation

Instructors' post-course evaluations of benefits:

- Achieved the goal of having a critical mass of students, tripling class size
- Discussions, team activities and debates were more effective
- Technology worked well and forced each to be better a teacher
- Instructors were better prepared due to collaborative nature
- Successfully combined instructors' expertise
- Collaboration among three large research-based institutions
- Having the resources to try something new
- Students adapted well and quickly to new technology

Instructors' post-course negatives:

- Materials prepared before course initiation would have helped some students
- Need for fewer online lectures and more online discussions
- Some of the lectures and associated materials needed to be modified to accommodate course format.

Summary of Students' Responses to Questionnaires

Seventeen students responded to the post-course questionnaire, with responses summarized as:

- All respondents said that an instructor-prepared packet of course materials would have helped.
- 8 of 17 said that a textbook would have been helpful
- 14 of 17 said that readings were interesting and relevant
- 12 of 17 thought course achieved a good balance of theoretical and applied concepts
- 10 of 17 thought debates were helpful
- 8 of 17 said the course provided insight into the functioning of the scientific enterprise.
- 9 of 17 said they felt as though they were part of a learning community
- 9 of 17 mentioned that they did not get to know participants at the other sites.
- 8 of 17 said that getting instructors' different points of view on biological control was very beneficial

Summary

In their combined course, the instructors tried to maximize on-line interactions at individual sites and across sites. The course used evaluation methods to determine how the on-line version of the course compared with the individual, "traditionally taught" courses, to assess the success of distance-delivery. This course was an experiment in distance education with a specialty course taught by several instructors at multiple universities, each with students registered locally. The instructors decided to collaborate in teaching this course to use technology to reach more learners. In addition to expanding the number of students reached, the critical mass of students allowed more interactive activities than would have been possible for small enrollments in individual classes at single institutions. The goals of the four instructors to combine their areas of expertise and to use technology to connect students with similar interests were achieved, and have application for other similar specialty courses in other scientific disciplines.

Reference

O'Neil, R. J., and R. N. Wiedenmann. 2008. The Midwest Institute for Biological Control: 17 years of a different kind of distance education. American Entomologist 54 (1): 6-9

This paper is dedicated to the memory of Robert J. O'Neil, who passed away in February 2008.

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NACTA Yesterday

50 Years Ago (Volume V, No.2) 1961

In his President's Message, John T. Carter wrote: "If we as teachers are to grow, develop, and become more proficient in our respective fields of endeavor – if our departments and institutions are to rise in stature, the burden of responsibility in accomplishing such is placed upon us as individuals. The purposes for which NACTA was born and for which it exists have been stated; and many dedicated educators have given liberally of their time and experience in bringing it along during these early years. What has been your association? As in other organizations, members will receive in proportion to their giving and that those who feel their "receiving" has been rather skimp, will find, upon self–analysis, that their "giving" was of the same caliber."

This message is still valid today as we strive to increase our endowment, recruit members, serve NACTA, and reward fellow educators.

30 Years Ago (Volume XXV, No.1) 1981

Eugene Ross from New Mexico State University published and article: *What Characterizes a Good Teacher?* The characteristics students' mentioned most frequently were: "Presents well organized notes and lecture," "Answers your questions and does not embarrass you," "Is interested in teaching," "Can relate to the student," "Has the ability to get the information across," "Gives clear explanations," "Speaks clearly," "Helps students when asked, and "Personally knows students' names"……on the personal side, students mentioned: "Is concerned about students," "Is friendly, talks to you in and out of class," "Helps you when you need it," "Shows respect for students," "Is honest with students," "Has patience," "Enjoys teaching," and "Tells students where they are according to their grades." Characteristics for a good advisor were: "Helps pick out classes," Helps you meet your requirements," "Helps you with problems (personal and academic)," "Is understanding," "Knows students personally," and "Takes time to visit with you."

Food for thought, 30 years later. I don't think students have really changed all that much.

20 Years Ago (Vol. XXXV No.1) 1991

"What Skills Do Undergraduates Need?" That was a title of an article written by Andrew Barkley from Kansas State University 20 years ago. He reported in his summary: "That over 97% of the responding alumni of the College of Agriculture at KSU found communication skills to be important in their current positions….the ability to deal with others may be difficult to deal effectively with others may be difficult to teach in the classroom and may be most easily learned through extracurricular activities and interaction with other students. However teacher influence can have an impact on student development within the classroom environment by providing a positive role model. Computer skills appeared to be important, but less so than communication and people skills. This result was encouraging from the standpoint that the workplace is not totally depersonalized for the majority of agricultural graduates."

Communication and people skills still top most of the "want lists" for our employers. Concern that we are depersonalizing the work place was a concern then.

10 Years Ago (Vol. 44 No.1) 2001

Bryan Garton et al. published a paper in the March 2001 Journal: "Factors Associated with the Academic Performance and retention of College of Agriculture Students." The concluded that learners preferring a field independent (students that view concepts more analytically, finding it easier to solve problems, and favor learning that requires individual effort) learning style exhibited greater academic performance, measured by GPA, than their field-dependent (students who tend to perceive globally, are more attuned to their social environment, learn better when concepts are humanized) peers during their first year of college. However a higher percentage of field-independent learners did not continue in college past their first year of enrollment. The question remains: Why did field-independent learners have greater success yet have a tendency to discontinue their enrollment in college? The best predictor of academic performance during the first year of college was high school core GPA and ACT score. Field-independent learners tend to favor careers in areas such as agriculture. Field-dependent learners outperform the field-independent learners in courses commonly referred to as "general education," which largely comprise the course load in which freshmen and sophomore students frequently enroll. During the first two years of college students

in colleges of agriculture are typically exposed to more non-agricultural curricula than agricultural class work. As a result, courses required for a specific major study are often limited to the last two years of a student's academic career. Perhaps a more uniform mix of course offerings–or the postponement of selected general education courses to later years–would facilitate increased retention of field-independent learners."

With all the concern about enrollment and retention in our colleges, this article should be revisited and used as a reference point for addressing curriculum development.

Jim McKenna
NACTA Historian

Guitar Lessons: A Life's Journey Turning Passion Into Business

By Bob Taylor, 2011, Wiley, 288 pages, $24.95, ISBN: 9780470937877

Few people find a job during their lifetime they love so much they'd do it for free. Bob Taylor of Taylor Guitars is one of those people. The co-founder and President of the world's premier manufacturer of high-end acoustic and electric guitars knew from the moment he made his first guitar as a teenager that he'd found his passion, but little did he know the formidable challenges that awaited him and co-founder and CEO Kurt Listug. From their early struggles to stay in business to the rollercoaster ride that followed the rise, decline and eventual reemergence of the acoustic guitar industry, the business partners more than survived -- they went on to build the top-selling acoustic guitar brand in the United States. For two inexperienced "kids" with a dream of having their own guitar shop, the odds of success were stacked against them, and yet they overcame each obstacle.

The book recounts the hard-knock lessons that helped make Taylor Guitars an industry leader. From Bob Taylor's earliest lessons in dismantling household appliances and bikes to the extraordinary sweat equity that grew the business, Taylor imparts his experience as a tradesman with consideration for building a business on the values of quality products and passion for perfection -- values that often seem counterintuitive in today's mass production culture.

By sharing the business and life experiences that nurtured the company's growth, Bob Taylor offers everyone from business leaders to young dreamers in today's world a fresh perspective on how hard work and perseverance can overcome challenges in one's profession and life.

The book resonates with the heart and soul of a craftsman. Unlike seemingly every other business book being made today, Taylor is not out to preach a four-hour workweek or ask you to mull about what Google might do in a certain situation--there is no get rich quick scheme here. Taylor simply shares stories--both positive and negative--that took place behind-the-scenes at Taylor Guitars since its founding in the early 1970s. It's fascinating and enlightening and, more than anything, it's real. The book is a good read teaching lessons of perseverance and success to anyone.

To learn more about the real-life wisdom of Guitar Lessons and to read a chapter excerpt, please visit www.taylorguitars.com/products/bob-taylor-guitar-lessons-book/

About Taylor Guitars: Founded in 1974, Taylor Guitars has evolved into one of the world's leading manufacturers of premium acoustic and electric guitars. Renowned for blending an innovative use of modern technology with a master craftsman's attention to detail, Taylor guitars are widely considered the best sounding and easiest to play in the world. Many of today's leading musicians make Taylor their guitar of choice, including Dave Matthews, Prince, Jason Mraz, Steven Curtis Chapman, Serj Tankian, Zac Brown and Taylor Swift.

Parker Pen
Kamima College

Rebels for the Soil: The Rise of the Global Organic Food and Farming Movement

By Matthew Reed, 2010, Earthscan, London, U.K. $84.95, 168 pages, ISBN 978-1-84407-597-3

In an unusual and intriguing social history of organic food and farming, author Matthew Reed has chronicled the origins, the rise, and the potential peak and eventual fall of this popular contemporary movement in the food system. Based on in-depth scholarship and thoughtful analysis, he traces the growth of organics from the early work of Rudolph Steiner on the continent, Albert and Gabrielle Howard in India, and Evelyn Balfour and the Soil Association in U.K. up to the current time. His exhaustive historical treatment of organic farming brings in many names and connections perhaps unfamiliar to many of us, weaving these into a compelling narrative that is an excellent complement to the recent and often more technical history by William Lockeretz and colleagues (Lockeretz, 2007). Rebels for the Soil is a valuable contribution to our understanding of the motivations of scientists, farmers, and social activists who forged the foundation of today's organic food system. The author also challenges its future.

A general chapter on social movements outlines the well-documented emergence of organic farming in the early 20th Century and how the process relates to other movements such as civil rights in the U.S. and opposition to church taxes in U.K. The author distinguishes the U.S. scholarship on how social movements were organized and who was involved, called “resource mobilization theory”, with that in Europe focused on why movements occur and their impact on broader society, historically called “academic Marxism.” He describes development of shared

beliefs, collective action often in the form of protests, and when successful how these evolve through phases of growing discourse and diffusion. The author concludes with speculation on the unique role of information technologies in promoting rapid social change, a process clearly demonstrated in the futurist novel Prairie Fire (Armstrong, 2008) that describes a national populist strike by wheat growers in the U.S.

Broad interest in the value and improvement of the soil after World War II took various directions in Europe. Biodynamic farming in Germany and the Soil Association in U.K. were important movements in organic farming. Interesting to many readers will be the controversial association of biodynamic farming philosophy with that of some leaders in the emerging Nazi regime in Germany. Another surprise may be the apparent identity of organics and local food movements in U.K. with the aristocracy, an elite association similar to the concerns today about higher costs of organic food and lack of access to this alternative by low-income consumers. The perceived elitism in the Slow Food movement is another contemporary example. A unique source of support for organics was a small but vocal group of physicians and scientists who believed in the dietary benefits of organic and specific foods for providing health. Their early experiences and writings provide groundwork for today's growing interest and research in diet and health, especially the value of organic foods. Agricultural scientists and farmers through this period expanded their experiments in organic techniques, and in the process continued to ignore the rich practical experiences of farmers in East Asia, with the exception of F.H. King (1924) who explored systems in China, Korea, and Japan.

Parallel to the growth of the Soil Association was a rapid expansion of chemical farming after the war, followed by the high external input Green Revolution. Rachel Carson's (1962) acclaimed book Silent Spring raised many questions about chemical-intensive agriculture, and her concerns generated wider awareness of the negative effects of chemicals and provided a foundation for the formation of the U.S. Environmental Protection Agency. Debate in the U.S. between supporters of chemical-based and organic farming continues today.

What provided impetus to the organic farming and food movement through the 1960s and 1970s was the rise in environmentalism and general counter-culture movement in the West. The contributions of Fritz Schumacher in U.K. and Hans and Marie Müller in Switzerland provided support to Eve Balfour and other organic advocates in the formation of IFOAM in 1972. Edmund Goldsmith, founder of The Ecologist journal, and Barry Commoner, a prolific author, were important to the growing popular interest in a more environmentally sound approach to agriculture. Critiques of chemical farming grew, and this led to a new focus on marketing organic food.

Marketing organic food grew at the annual rate of 20% over the next two decades, as this prized commodity moved beyond health food stores to the aisles of Walmart, Safeway, and Royal Ahold. Some termed this the emergence of "Big O," in contrast to the more dispersed distribution from small shops and direct marketing schemes. Debates about certification of organic and use of other terms dominated this period, as well as what should be labeled as "local food." Governments began to play a more important role, as the E.U. and the U.S. adopted specific regulations about production and processing as well as the labeling of organic foods. Among these regulations are restrictions on use of GMOs in the European Union, reflecting a concern not shared by most consumers in the U.S. There is constant pressure from industry to allow use of these new transgenic cultivars in organic farming.

In one of the most intriguing chapters, the author ends the book with a prediction of the peak and decline of organic food. Beyond the current dip in organic purchases due to recession, he identifies a number of larger factors that will push us toward more efficient production of local foods, and thus a drastic reduction in transportation costs. Although recognizing the importance of comparative climatic advantage for production, he projects that fossil fuel costs and awareness of larger difficulties with imported foods will create new environmental and social boundaries in the food system. Reed cites the examples of Cuba and the Transition Towns in the U.K. as examples of future-oriented food systems that are sensitive to distance and need for seasonal consumption of local foods.

Author Matthew Reed has provided us with an alternative view of both the past and the future. He has delved into the history of organic farming to reveal the personalities and motivations of some of the prime movers in this alternative food sector, as well as evaluated current trends and predicted a future quite unlike that described by most writers. This is a perceptive book that will challenge the reader's assumptions about organic farming and foods, and help us all to study the system in perhaps a more objective way. It is a valuable resource for students in courses on organic farming, and others concerned about the future of the food system.

References

Armstrong, D. 2008. Prairie Fire. Mud City Press, Eugene, Oregon.

Carson, R. 1962. Silent Spring. Houghton-Mifflin, Boston, Massachusetts

Francis, C.A., editor. 2009. Organic Farming: the Ecological System. American Soc. Agronomy, Madison, Wisconsin.

King, F.H. 1924. Farmers of Forty Centuries: Organic Farming in China, Korea, and Japan.

Kirchmann, H., and L. Bergström, editors. 2008. Organic Crop Production: Ambitions and Limitations. Springer Verlag, Amsterdam.
Lockeretz, W., editor. 2007. Organic Farming: An International History. CAB International, Wallingford, Oxfordshire, U.K.

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The Online Teaching Survival Guide

By Judith V. Boettcher and Rita-Marie Conrad, 2010, Jossey-Bass, 380 pages, $38.00, ISBN: 978-0470423530 (also available on the Kindle)

The Online Teaching Survival Guide offers faculty a wide array of theory-based techniques designed for online teaching and technology-enhanced courses. Written by two pioneers in distance education, this guidebook presents practical instructional strategies spread out over a four-phase timeline that covers the lifespan of a course. The book includes information on a range of topics such as course management, social presence, community building, and assessment. Based on traditional pedagogical theory, The Online Teaching Survival Guide integrates the latest research in cognitive processing and learning outcomes. Faculty with little knowledge of educational theory and those well versed in pedagogy will find this resource essential for developing their online teaching skills.

At a time when resources for training faculty to teach online are scarce, the authors have presented a must-read for all instructors new to online teaching. By tying best practices to the natural rhythms of a course as it unfolds, instructors will know what to do when and what to expect. The book is a life raft in what can be perceived as turbulent and uncharted waters.

Developed from years of experience supporting online faculty, the book provides practical tips and checklists that should especially help those new to online teaching hit the ground running.

This book blends a fine synthesis of research findings with plenty of practical advice. It should be especially valuable for faculty teaching their first or second course online. But any instructor, no matter how experienced, is likely to find valuable insights and techniques.

Parker Pen
Kamima College

The Seeds We Sow, Kindness That Fed A Hungry World

By Gary Beene, 2010, Sunstone Press, 404 pages, $20.00, paperback, ISBN: 978-0865347885

"Practice random acts of kindness" is a catchy little phrase. It is also nonsense. There should be nothing random about the decision to be kind. There is no single action more powerful and "The Seeds We Sow" offers proof of the cross-generational power of kindness.

The book tells the story of the intertwined lives of George Washington Carver, Vice President Henry Agard Wallace, and Nobel Laureate Norman E. Borlaug. It tells how their kindness and passion to feed the world was passed on and enhanced across generations. In his quest to help feed the world, George Washington Carver was probably the most influential not because he was the "peanut man," but rather because he was a "gentle man." His protégé Henry Agard Wallace grew up to be the Secretary of Agriculture and Vice President of the United States. He was likely one of the most under-appreciated and misunderstood leaders of the twentieth century. In turn, Wallace passed the baton to Norman Borlaug, who worked in quiet obscurity for most of his life.

M.S. Swaminathan of India summed up his friend's life, "Norman Borlaug is the living embodiment of the human quest for a hunger free world. His life is his message." Because Carver, Wallace and Borlaug lived, so do we. After a 30 year career in Vocational Rehabilitation and Special Education, the author retired as the state director of the New Mexico Division of Vocational Rehabilitation in September 2008. He and his wife, Carla, enjoy life at their home in Santa Fe, New Mexico. Gary states that for him kindness did not always come naturally. He says, "I was one of those poor saps who had to do a lot of personal work before understanding that only the merest quarter-turn of the heart separates us from life's abundance."

Franz Kafka once said: "Books should be like ice axes, breaking the frozen sea within us." Gary Beene's elegantly written book is just such a book.

It becomes incumbent upon all of us to educate ourselves about what kindness-compassion-humanitarianism is - what it looks like in the world, what it feels like inside. The act of reading is only one way to do that. For those of you who enjoy biography and history, Gary Beene's book might be like one of Kafka's ice axes.The book is a fascinating piece of unknown history with a very important message about kindness. This book offers an historical proof that every act of kindness ripples through time and impacts the lives of untold millions of people in future generations.

Parker Pen
Kamima College

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